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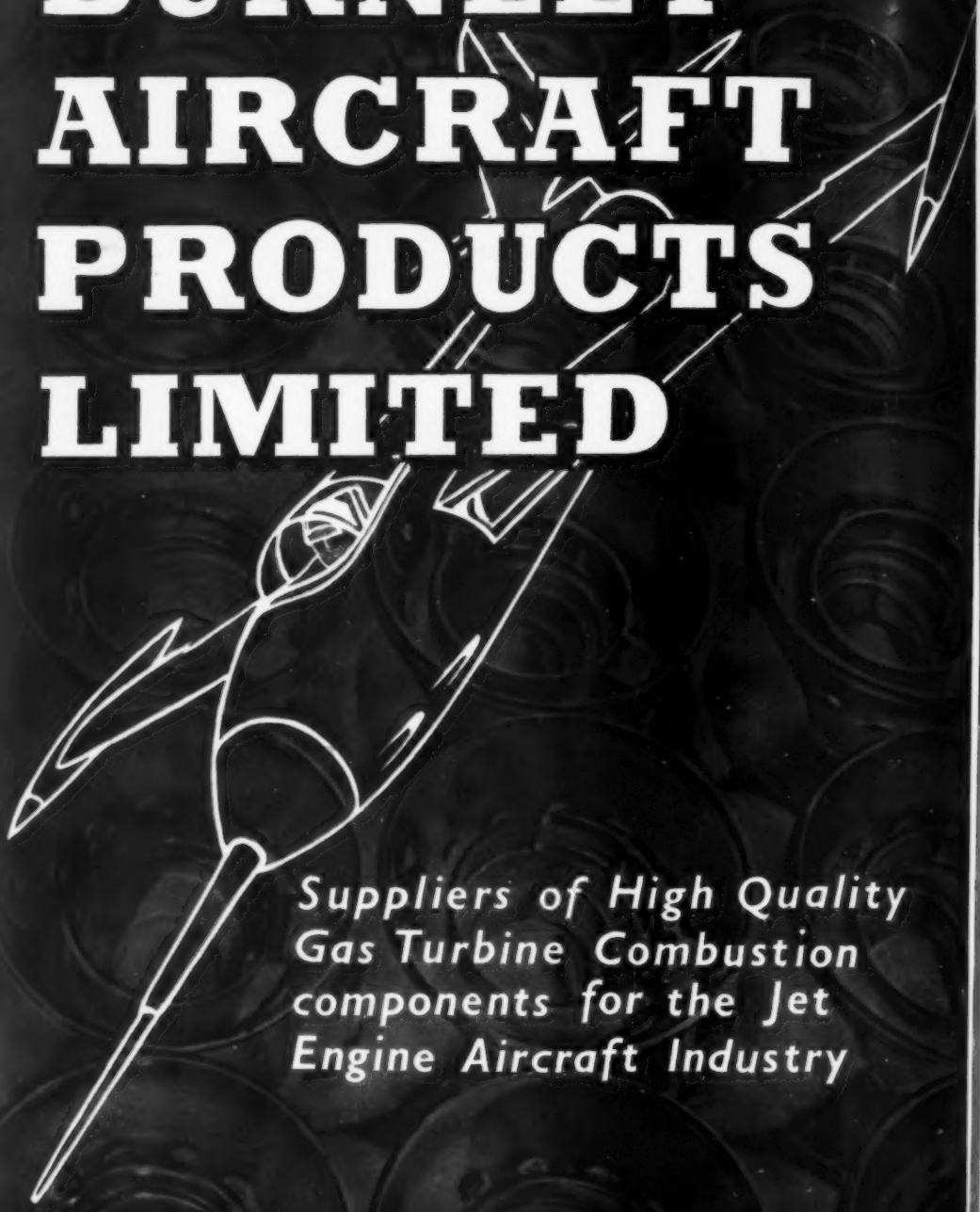

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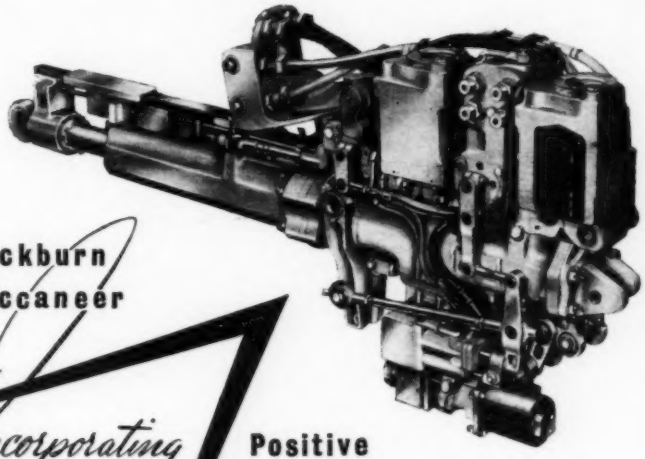

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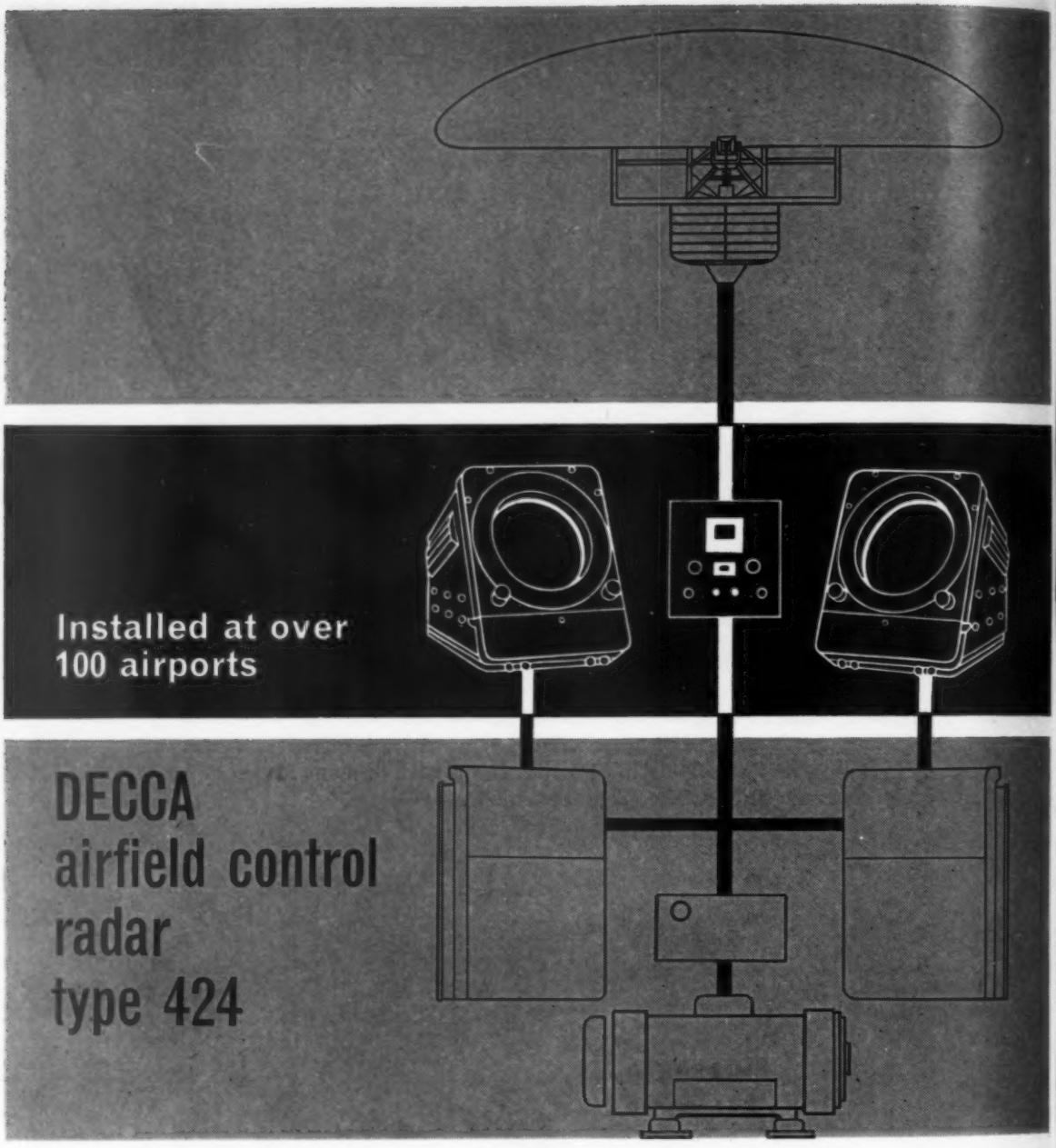

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U.S. NAVY-SIKORSKY HSS-2 SPEEDS TO NEW WORLD RECORD

On May 17th at Bradley Field, Connecticut, U.S. Navy pilots in a Sikorsky HSS-2 crossed the finish marker on a three-kilometer straight line course to set a new world helicopter speed record. The speed: 310.4 kilometers an hour—41.5 kilometers an hour faster than the previous record set by a Russian Mil-6 over a 100-kilometer closed circuit in 1959. This was the first official speed test of the new generation of Sikorsky twin-turbine helicopters. The boat-hulled HSS-2, which flew in its standard configuration, soon goes into fleet service with the U.S. Navy as a key weapon in anti-submarine warfare defenses. It is the world's most advanced helicopter weapons system—and now the world's fastest helicopter as well.

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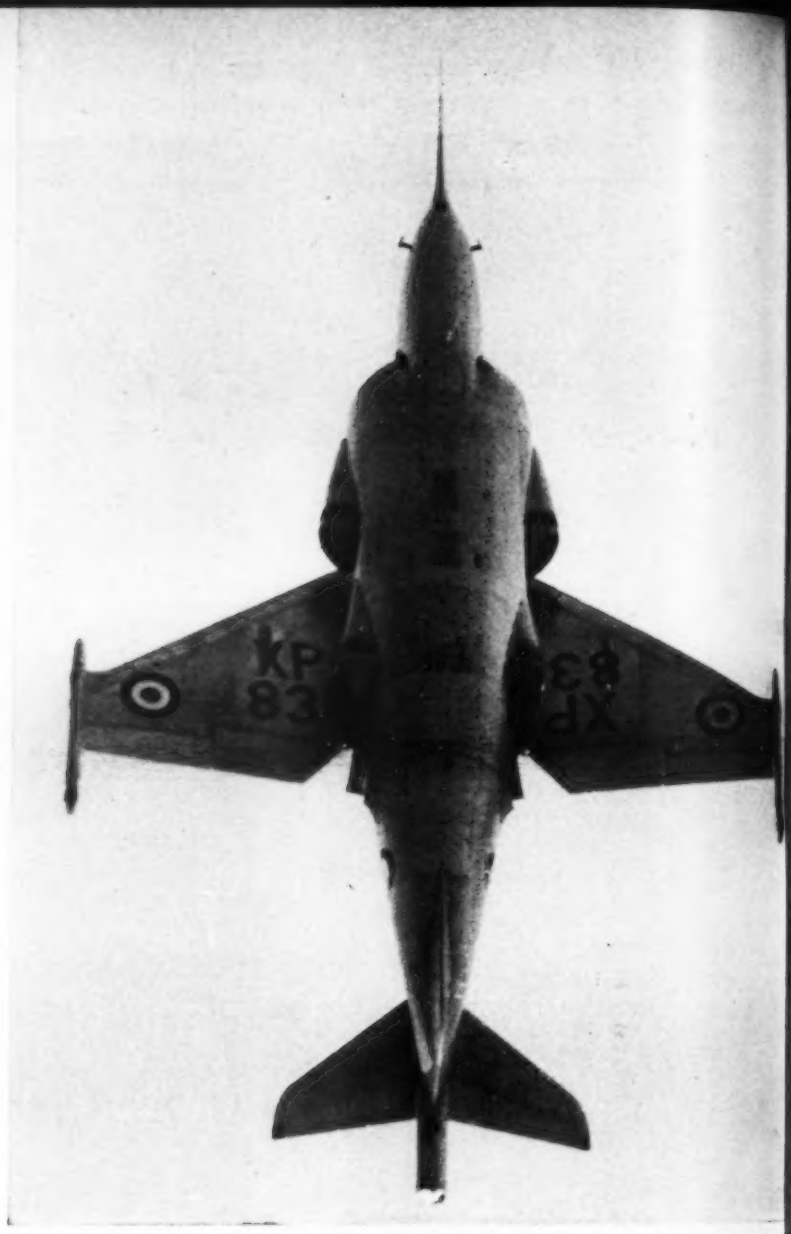

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FLIGHT

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Official Organ of the Royal Aero Club First Aeronautical Weekly in the World Founded in 1909

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H. F. KING MBE

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W. T. GUNSTON

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J. M. RAMSDEN

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ROY CASEY

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Prudent Enthusiasm

A MINOR seasonal ailment suffered annually by every aeronautical journalist is the rash of questions from well-meaning acquaintances about what's going to be new at Farnborough. It is always difficult to temper one's professional enthusiasm for the occasion with the right amount of prudence, for disappointed and disgruntled visitors to the greatest national air show on earth are not the sort required. The same considerations may have underlain a recent pre-Farnborough announcement by the Society of British Aircraft Constructors, which fails to include a list of aircraft. What it does include is some highly gratifying information about the extent of this year's static show—a record number of 397 stands in the exhibition building, outside equipment display and radar and guided weapons parks, and yet another increase in the extent of the equipment park. (There is, too, some incidental intelligence of interest to the connoisseur, e.g., that more than a thousand tons of tubes and fittings are used in the construction of the windbreak and enclosures.) But the list of aircraft has yet to appear. We shall not, even so, be embarrassing our friends at the SBAC if we suggest that in terms of novelty Farnborough '61 promises to be one of the best for years. Meanwhile, it is exciting to conjure with various as yet embargoed designations of Beagle executive aeroplanes and with other stirring appellations such as Bristol 188, Hawker P.1127. . . . But we must remember to temper our enthusiasm with prudence.

A New Tax on the Airlines

FOR the air transport industry, an ominous passage in the White Paper on airports published last week (see page 202) reads: "*The Government consider that it would be right to levy charges for the use of their technical services, both en route and at aerodromes.*" This is the first time that the Government has publicly proposed to charge the airlines for so-called *en route* services.

In handing the management of Britain's "big four" international airports (Heathrow, Gatwick, Stansted and Prestwick) to an independent authority, and the others to local authorities or an "agent," the Government will quite rightly retain control of technical services. So why, it may be asked, is it ominous that a charge should be levied for *en route* facilities?

En route services can be defined as those provided mainly by installations sited elsewhere than at aerodromes. These cost £3m last year and £2.7m in the previous year. They are used by aircraft overflying the UK as well as by those being routed into UK airports, and include weather forecasting, search and rescue, aeronautical information, and of course radio, radar and ATC. The Chicago Convention recognized that charges might be imposed for such facilities, and some countries have cashed in—Canada for example. But hitherto the UK has not done so, *en route* costs being cross-subsidized by higher and higher landing fees.

Why, the airlines' argument will run, should we pay for a club Tiger Moth pilot to be fished out of the sea, or to be given a weather forecast, or helped with a flight plan?

But why should the hapless taxpayer continue to pay for such services to airlines? The answer is that *en route* services are paid for out of landing fees. So it is reasonable to expect that when the Ministry does impose *en route* charges, it will ensure that landing fees are proportionately reduced.

MAPLE LEAF AND RISING SUN distinguish the Canadair CF-104 (left) and Lockheed F-104J (right) in these photographs of the first take-off by each type. Both are basically F-104Gs, but they differ in equipment. The first two CF-104s were flown in C-130s to Palmdale for RCAF/Lockheed testing; Nos 3 to 200 will fly from Montreal. The first three F-104Js are Lockheed-built, and are flying from Palmdale; 177 more will be constructed in Japan

FROM ALL QUARTERS

Farnborough 1961

A PREDICTION that this year's Flying Display and Exhibition of the Society of British Aircraft Constructors promises, in terms of novelty, to be one of the best for years is made in a leading article on the previous page. A statement by the SBAC reports that demand for space has been greater than ever before. There will be a record total of 397 stands in the exhibition building, the outside equipment display, and radar and guided weapons parks—15 more stands than last year. The SBAC statement continues:—

"Most of these extra stands will be in the exhibition building, which has had to be enlarged by 5,000 sq ft to cover 130,400 sq ft. The last time it was rebuilt was in 1957, when it was enlarged by 14,000 sq ft to cover 125,400 sq ft. The area of the guided weapons park will be about the same as in 1960, but the outside equipment park, which was enlarged by 25 per cent last year, will again be increased in area. During the last ten years the floor area of the exhibition building was doubled in area and, it is reasonable to suppose that the number of stands at future displays will exceed the 400 mark.

"Construction of the building is a massive undertaking. Including the offices, restaurant and other rooms, half a million square feet of floor area is under canvas. More than 2,000 tons of tenting, flooring, etc., has to be brought into Farnborough, while more than 1,000 tons of tubes and fittings are used in the construction of the windbreak and enclosures. Some 150 tons of wood, lino and paint are used in the construction of the stand shell. Special fire precautions have to be taken in the exhibition building and a high-pressure water supply is provided. Fire station look-out posts and patrols are manned twenty-four hours a day. In the exhibitors' restaurant, more than 14,000 meals are served during display week.

"One of the Society's new member-companies, Britten-Norman, will be exhibiting for the first time. There will be models and photographs of the company's two ground-effect vehicles, Cushioncraft 1 and 2, on view and examples of rotary atomizer spray equipment for agricultural aircraft. Some 95 per cent of the sales of this equipment has been on the export market. Firestone Tyre and Rubber, but one of several companies exhibiting tyres, will show examples of a high-speed tyre specially developed to withstand the heavy strain of landings at up to 225 m.p.h. More than 40 per cent of the production of these tyres have been exported.

"The Aircraft Equipment Division of English Electric will be exhibiting two products never seen before at Farnborough—sub-assemblies from a hydraulic constant-speed generator drive which will have completed 1,600 hours' flying on a BOAC airliner, and a constant-frequency system and 'wild' frequency system displayed together. Spurling will be displaying a mobile passenger stairway which can be quickly and easily adjusted from a height of 7ft to almost 13ft. These stairways have achieved considerable success in the export market. Aircraft Furnishings will be showing

TO SEE THE AVRO 748 (the type is being built in India under licence) was the objective of a party from the Indian Ministry of Defence who recently visited the Woodford works. Front, l to r: Mr D. W. R. Andrew, Avro sales; Sir Harry Broadhurst, managing director; Mr S. Jayasanker, financial adviser to Indian Defence Ministry; Mr R. P. Sarathy, additional secretary to Ministry; Sqn Ldr Bhandari, of the IAF liaison team at Avro; and Mr S. G. Joy, general manager

examples of aircraft chairs which have been selling well abroad. Recent orders include one from New Zealand Airways and another from Misrair for, respectively, Friendships and Comets.

"Some 449 lives have been saved by Martin-Baker ejection seats and the company will be showing two examples of these devices—the Mk 4 MSA, as installed in the Royal Navy's Buccaneers, and the Mk H5 for the United States Navy's Phantom 2s."

Stewart Scott-Hall

AS this issue closes for press we learn with regret of the death in Australia of Mr Stewart Scott-Hall, CB, MSC, FCGI, DIC, FRAES, FIAS, head of UK Defence Research and Supply Staff, Australia, and Scientific Adviser to the High Commissioner. Mr Scott-Hall joined the Aerodynamics Department of the RAE in 1927 and was at the A & AEE, Martlesham Heath, between 1929 and 1933. Thereafter, until 1937, he was resident technical officer with Vickers Supermarine. Between 1937 and 1939 he was in charge of the Ordnance Ballistics Laboratory, and between 1940 and 1941 was technical assistant to the Director-General of Aircraft Production, MAP. From 1941 to 1944 he was head of the Armament Department at RAE and was superintendent of performance testing at Boscombe Down between 1944 and 1946. From 1946 to 1953 he was Director-General, Technical Development (Air), and was head of the MoS Staff, British Joint Services Mission, Washington, from 1953 to 1956. He took up the post of Scientific Adviser to the Air Ministry in 1956, continuing there until 1959.

ANNUAL VISIT of Empire Test Pilots School staff and students to the Sperry Gyroscope Co Ltd. This year, accompanied by their Commandant (Capt K. R. Hickson, RN), they visited the company's Brentford and Bracknell establishments and saw some of the latest developments in automatic control and instrumentation

BUSINESS QUEEN: An executive Beechcraft Queen Air was delivered to Davy-Ashmore Ltd, the Sheffield engineering company, by Short Bros and Harland, Beechcraft distributors, at Manchester Airport, on August 1. Left, Mr David Keith-Lucas of Shorts; right, Mr M. A. Fiennes of Davy-Ashmore

HSA Overseas Changes

CHANGES in the management of the de Havilland Aircraft Co of New Zealand Ltd and Hawker de Havilland (Pty) Ltd, South Africa, have been announced by Hawker Siddeley Aviation Ltd following the retirement of Mr John A. Kerr as managing director of the New Zealand company.

Mr Kerr, who has been in charge of the New Zealand company since 1945, is being succeeded by Mr J. Lorentz, at present general manager of the South African company. Mr Lorentz has handed over general management of Hawker de Havilland (Pty) Ltd to AVM E. W. S. Jacklin, CBE, AFC, formerly Chief of Air Staff and AOC, Royal Rhodesian Air Force.

Mr Kerr, who is an Australian and a pilot of wide experience (he joined the Australian DH company in 1940 as a test pilot and service manager, moving to New Zealand at the end of the war), is to remain on the board of the New Zealand company. Mr Lorentz has had a long career on the engineering, flying and business sides of aviation; he learned to fly at Brooklands in 1931, has worked in Germany and with Pratt & Whitney in the USA and during the Second World War commanded No. 16 Sqn, SAAF (Beaufighters). AVM Jacklin served during the war in Abyssinia and the Middle East, was later a flying instructor at the Empire Central Flying School, graduated at the RAF Staff College and was air liaison officer in London before returning to Southern Rhodesia after the war. Since April 1950, when he took command of the Southern Rhodesian Air Force, he has been largely responsible for the build-up of RRAF air power to its present strength.

Caribou Weight

A NOTE in our issue of July 13 concerning the DHC-4A Caribou stated that this aircraft had now been certificated at an increased gross weight of 24,000lb. In fact, the Caribou was licensed in the first instance at 26,000lb, and it has now been licensed, in the full transport category, at 28,500lb.

IN BRIEF

Mr W. C. Taylor, vice-chairman of Qantas, has resigned to become chairman of Hawker Siddeley Australia.

Shell-Mex and BP Ltd will again be providing a fuelling service for private aircraft landing at RAF Odiham, Hants, from September 4 to 8 in connection with the SBAC Show at Farnborough.

Maj-Gen C. B. Westover handed over command of 7th Air Division, USAF Strategic Air Command, last week to Maj-Gen E. Broadhurst. The new commander, whose headquarters are at High Wycombe, was formerly Chief of Staff at SAC headquarters, Omaha, Nebraska.

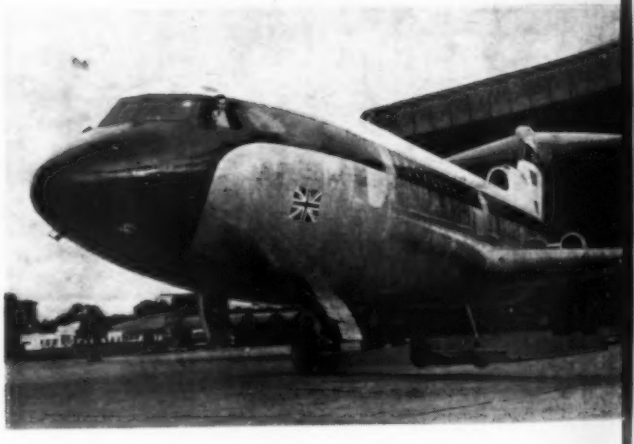
The item numbered C4 in the key to the detailed cutaway illustration of the English Electric Lightning F.1A published in our July 13 issue incorrectly ascribed the manufacture of the tailplane and autostabilizer amplifiers. These units are, in fact, an integral part of the autopilot and autostabilization system produced by Elliott Brothers (London) Ltd.

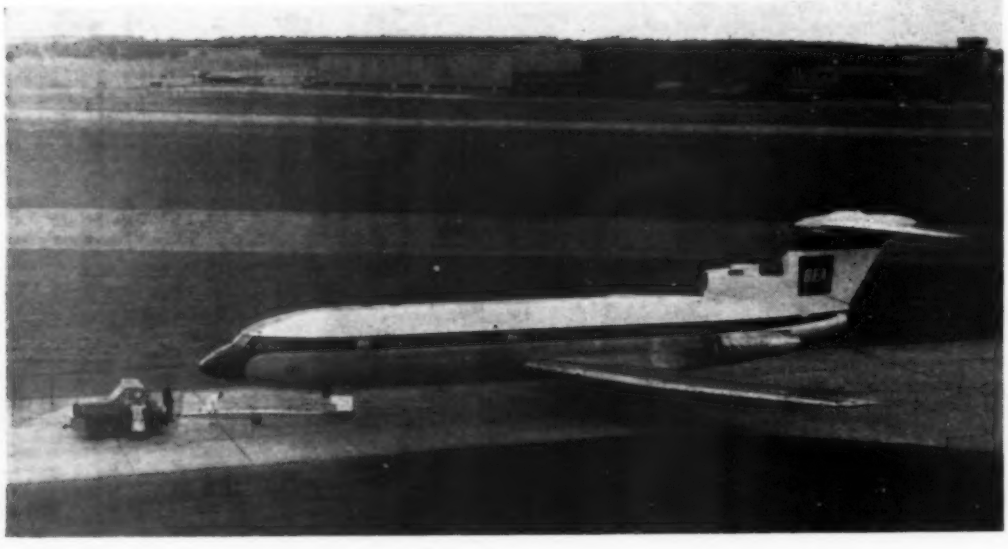
Rumbold & Co, the aircraft seating specialists, announce that Mr. F. H. Boyd-Carpenter has been appointed managing director. Mr Boyd-Carpenter was associated with the late Mr Louis Rumbold in the formation of the company in 1932 and has been a director ever since. Rumbold state they are busier than they have ever been, and that a very large proportion of their orders are for export.

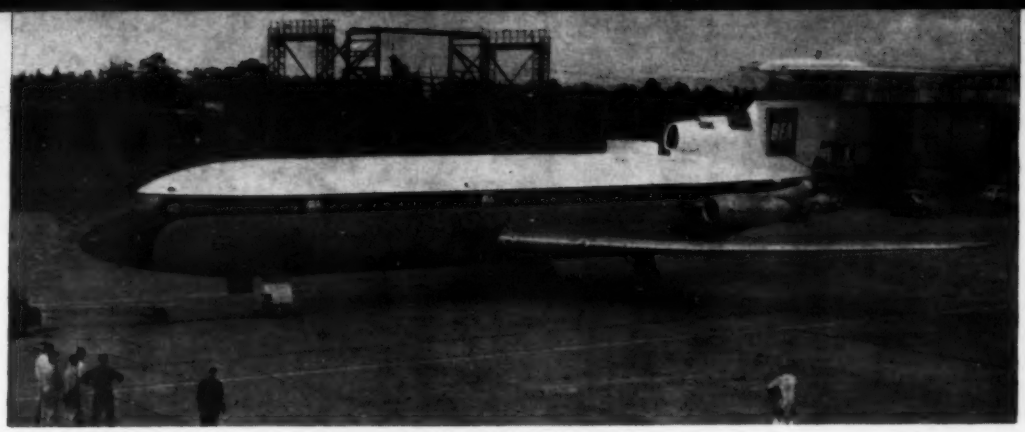
McAlpine Aviation, the business-flying division of Sir Robert McAlpine and Sons Ltd, have been appointed sole distributors for Piaggio aircraft throughout the United Kingdom and Eire. The company will offer for sale the whole range of the Italian-made Piaggio civil aircraft, with special emphasis on the twin-engined P.166 six/eight-seater executive machine.

SPORT AND BUSINESS: Mr Arthur Harrison, president of the Warwickshire Aero Club (right) takes delivery of his new executive Aero 145 at the club's HQ at Elmdon. With him are Mr Neville Birch, club secretary (left) and Mr Arthur Penzer, CFI *(see page 193)*

THIS IS THE TRIDENT





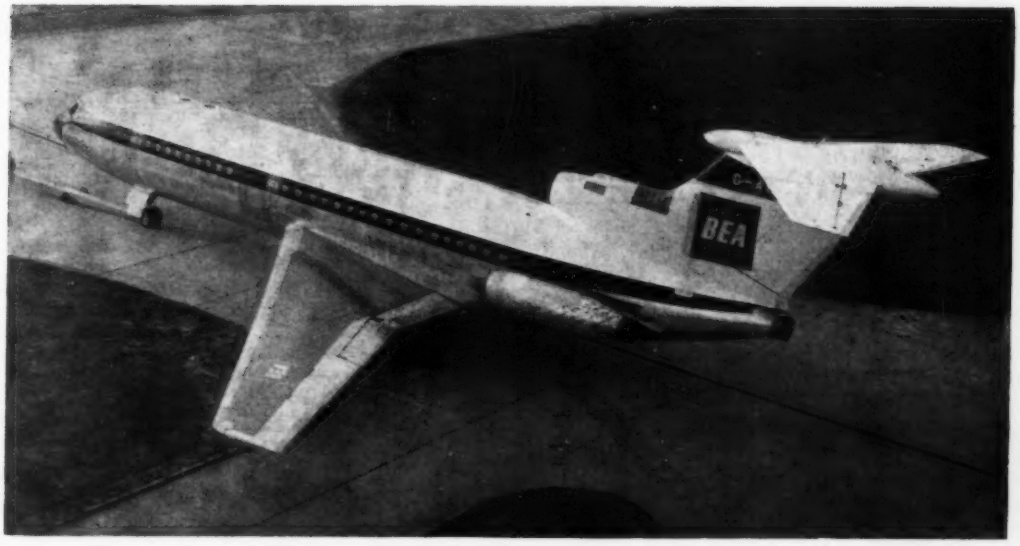


FIRST sight of a new de Havilland aeroplane is always guaranteed to arrest the attention of the aviation world. Not since the first DH 106 Comet was rolled out in April 1949 has a Hatfield event been more eagerly anticipated than the roll-out of the first DH 121 Trident—particularly as de Havilland publicity policy has been to cut the cackle till the egg is hatched. The hatching (roll-out in the jargon) took place at 5.30 on the warm sunny evening of last Friday, August 4.

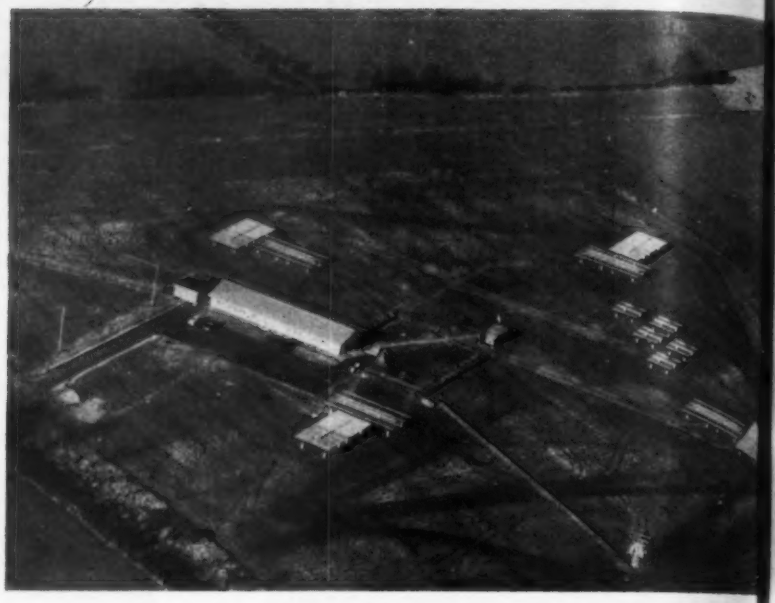
Much work remains to be done on this, the first of 24 aircraft for BEA, before its three Rolls-Royce Speys thrust it into the start of an intensive flight-test programme. If all goes well, maiden flight should be before the end of the year. One quite important test is already passed: like all de Havilland types—bar none that we can recall—the Trident is a good-looker.

Among the de Havilland people who witnessed the Trident's début were, left to right in the group picture: Mr John Cunningham, chief pilot and director; Mr H. G. Sturgeon, managing director; Mr J. P. Smith, chief designer (civil aircraft); Sir Geoffrey de Havilland; and Mr C. T. Wilkins, technical director.

FOOTNOTE: Seen with the Trident in one of the pictures is BEA's fourteenth Comet 4B—delivered on the same day to complete the corporation's present planned Comet fleet two months ahead of contract date.



Missiles and Spaceflight



A new view of the NASA Minitrack Station at Winkfield, Berkshire, which is operated by personnel of the DSIR Radio Research Station, Slough. The Minitrack interferometer comprises the four pairs of large aerials together with the five smaller aerials in the north-east quadrant.
Photograph by Fairey Air Surveys

THIRD MINUTEMAN FLIGHT

The third Boeing SM-80 Minuteman ICBM to be test-fired achieved a successful full-range mission from Cape Canaveral on July 27. All three stages ignited successfully, the inertial guidance system was hooked up and, despite a telemetry malfunction, the Avco Mk 5 re-entry vehicle impacted about 5,000 miles down-range.

The first shot, on February 1, was a singular success, and a mass of data was acquired during a 4,600-mile flight. The second, on May 19, was terminated by the Range-Safety Officer following separation and ignition of the first stage. It was announced at the time that "guidance trouble" was responsible; our contemporary *Aviation Week* blames "a loose soldered connection between the thrust-vector control system and a nozzle activator."

Atlas-Agena launch vehicle with Ranger I spacecraft (described in last week's issue) on the pad at Cape Canaveral prior to launch. Several postponements were made during the past two weeks

JOINT NASA/INDUSTRY SATELLITE PLANS

Under the terms of the agreement between the National Aeronautics and Space Administration and the American Telephone and Telegraph Co for the development of active communications satellites (reported in last week's issue), A. T. & T. will design and build the satellites at its own expense and will pay NASA for the space agency's facilities and services. These will include Thor-Delta launch vehicles, launching and tracking facilities and range and launch crew services. NASA will also provide the company with telemetry and spacecraft acquisition information received by its Minitrack tracking network.

The company will report to NASA the results of the communications experiments and significant information developed during evaluation of the experiments which may bear directly on other communication-satellite programmes. All experimental data and project results will be made available by NASA to the world scientific community.

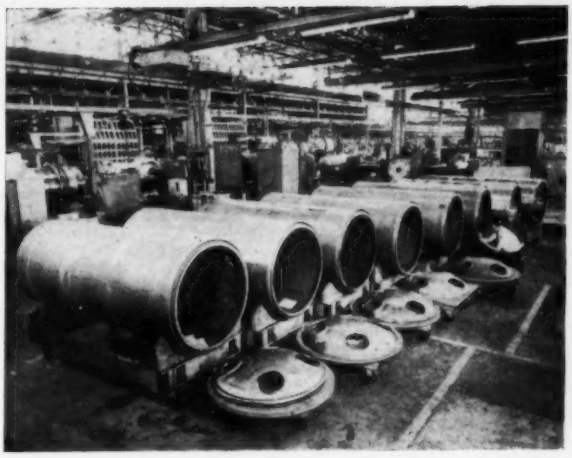
The satellites, from two to four in number, will be spherical and will weigh 125lb each. They will be launched into 600-3,000 mile orbits at an inclination of 45°. Wide-band communications experiments—television, two-way telephone, radio and telegraphy—will be transmitted between the A. T. & T. stations at Rumford, Maine and Holmdel, New Jersey via the satellites. Signals will be received by the satellites from the ground stations on 6,390 Mc/s, and will be re-transmitted on 4,170 Mc/s by a single transponder and three-Watt travelling wave tube. Management of the project will be handled jointly by NASA's Goddard Space Flight Center and the Bell Telephone Laboratories of A. T. & T.

FIRST WORLD SPACE RECORDS

Records claimed for Maj Yuri Gagarin and Cdr Alan Shepard were confirmed at a meeting of the Astronautics Committee of the Fédération Aéronautique Internationale on July 18. Gagarin's flight in the *Vostok* spacecraft on April 12 established world records for duration in orbital flight (108min), altitude in orbital flight (327km) and greatest mass lifted in Earth orbital flight to an altitude of 327km (4,725kg). Shepard's sub-orbital flight in Mercury spacecraft *Freedom 7* on May 5 set up records for altitude without Earth orbit (186.3km) and greatest mass lifted without Earth orbit (1,832.61kg). These are the first space records to be confirmed by the FAI. President of the Astronautics Committee of the Federation is Mr D. J. Lyons of the Royal Aircraft Establishment, Farnborough.

TITAN PROGRESS

A test-firing of exceptional interest took place down the Atlantic Missile Range on the night of July 20-21, when a Martin Titan J-series ICBM accomplished a full-range 5,000-mile mission from



Several second-stage Minuteman ICBM rocket chambers, including some of lightweight titanium, are shown in various stages of completion at Avco Corporation's Lycoming Division in Stratford, Connecticut, where they are in volume production under contract with Aerojet-General Corporation. Lycoming recently accomplished successful hydrostatic testing of the first completed titanium chamber.

Cape Canaveral. Attached near the top of the second stage was a 5ft-long streamlined package containing a number of decoys, presumably in an effort to test the ability of the Nike Zeus detection and tracking radars installed on Ascension Island to discriminate between the Avco Mk 4 or GE Mk 3 re-entry vehicle and the spurious returns from the decoys. No details of the experiment were given, but "reliable sources" quoted by Reuter, suggested that the pod contained ten rockets, six fired at separation of the re-entry vehicle and the other four fired on re-entry. A US Air Force spokesman said merely that the flight had confirmed the compatibility of the pod and missile. Some 90min after lift-off a vessel near the impact area recovered a 30in capsule ejected from the re-entry vehicle and lowered by parachute. It contained apparently conventional instrumentation and data storage to record vehicle performance.

The seven Project Mercury astronauts visited St Louis recently on a visit to McDonnell Aircraft Corp, makers of the Mercury spacecraft. From the left, Alan Shepard, Scott Carpenter, John Glenn, Donald Slayton, Virgil Grissom, Gordon Cooper (kneeling) and Walter Schirra

Probably of equal significance was the flight of a Titan on July 25. This was the first flight of an M-series Titan, with the new pure-inertial guidance system developed for Titan 2. Titan 1 was originally to have had an inertial system, but this was transferred to Atlas in exchange for the latter's radio-inertial system by Remington Rand and Bell Telephone Laboratories. Although commendably accurate, this system is considered to be too susceptible to possible countermeasures, and to preclude the possibility of salvo firing. The new all-inertial equipment is much lighter, and is being developed by AC Spark Plug and IBM. The system will be fitted to all Titan 2s, and to late-production Titan 1s, and the July 25 mission was the first in which the servo-loop of the new system has been closed. Impact was achieved some 5,000 miles down-range, and performance was regarded as satisfactory.

CHEMISTRY IN ORBIT

The Discoverer 26 capsule recovered on July 9 contained a number of experiments designed to gather further information on the effects of the space environment on various chemical elements. The elements included silicon, iron, bismuth, yttrium, magnesium, nickel, lead, and uranium. Since the crystal structure of silicon is known to be changed by proton impingement, the inclusion of silicon samples aboard the satellite was hoped to provide information on the possible damaging effects of the space environment on solar cells made of this material.

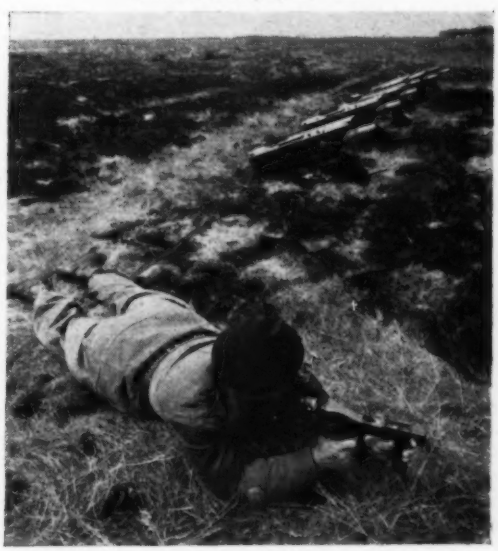
Remaining in orbit aboard the Agena B satellite vehicle were several experiments designed to provide additional information on cosmic and radio-wave radiation as well as the density of ion and micrometeoroid particles. Particle density was to be measured through the erosion of a tuned radio crystal that changes transmission frequency as it is gradually chipped away by the impact of these particles of cosmic dust. The erosion gauge and a micrometeoroid detector to record the number of impacts were mounted on booms which were extended after the satellite achieved orbit.

A special radio receiver aboard the Discoverer satellite was designed to receive radio noise emanating from space, and to relay the signals to Earth for analysis. Similarly, a device was carried to monitor cosmic rays and telemeter back information concerning the angular distribution of radiation in space.

ION ENGINE FLIGHT-TESTS PLANNED

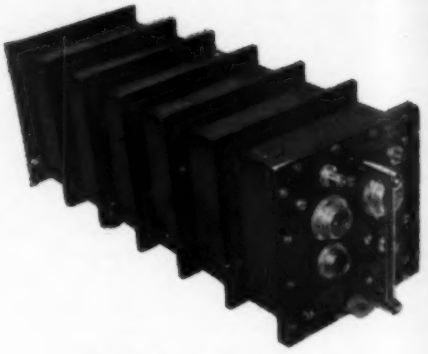
Two ion engines, one cesium-fuelled and developed by Hughes Aircraft Co and the other mercury-fuelled and developed by the NASA Lewis Research Center, are to be flight-tested by Scout rocket towards the end of 1962. The National Aeronautics and Space Administration has selected the Astro-Electronics Division of RCA for the negotiation of a contract to develop the payload capsule for flight-testing such engines. RCA will design, build and test seven capsules, three for ground tests and four for flight test. Each capsule will carry two electric engines.

Fully described in our July 27 issue, the Vickers-Armstrongs Vigilant recently "killed" 23 tanks in 26 rounds, and stopped an onrush by four tanks in 48 sec. This new photograph illustrates the latest sight/controller, and shows how an operator can control a battery of six rounds



Missiles and Spaceflight . . .

TARGET TELEMETERING



Telemetry transmitter unit

THE Australian-designed Jindivik Mk 102B flew for the first time on July 19. As described in a full account of the Jindivik in *Flight* for February 17, 1961, the Mk 102B is the British (imported) version of the basic Mk 2B, powered by a Bristol Siddeley Viper 11 turbojet and provided with very extensive trials equipment. The first flight was made at the RAE Llanbedr, and lasted 50min; and the same machine flew for 60min the following day and reached a height of 53,000ft. Jindivik 102Bs are assembled in Britain by Fairey Engineering, who provide service support, design and manufacture modifications and are assisting in training operators and ground servicing teams; R. G. Smith is technical representative i/c trials at Llanbedr.

Fairey have now been associated with the Jindivik, and with other target-aircraft programmes, for several years. Both in Britain and in Australia they have acquired extensive experience in designing and producing "black boxes" and complete airborne systems. They have been particularly concerned with airborne photographic and with telemetry equipment—the subject of this article.

Broadly speaking, the purpose of telemetry equipment being used in unpiloted target aircraft, such as Meteors, Canberras and Jindiviks, is to convey to the ground controller via a radio link essential information which would normally be available to a pilot in the cockpit of a manned aircraft. This information is presented to the ground controller by indication on replicas of the dials of aircraft instruments. It is also recorded on suitable ground instrumentation for future playback if required. The data normally telemetred consists of airspeed, altitude, rate of climb, fuel remaining and engine r.p.m. Special additional facilities may also be introduced, such as telemetering of jetpipe and engine-bearing temperature in the Jindivik. Apart from the transducers, the redesigned equipment now being introduced was developed by the Fairey Aviation Co, Salisbury, South Australia, in conjunction with the Weapons Research Establishment.

A redesign was called for mainly owing to the inability of the present equipment to meet the exacting environmental conditions of more advanced target aircraft—particularly with regard to a demand for operation at considerably higher altitudes and a requirement for more flexibility for the introduction of additional data channels. The new items have been fully type-tested to satisfy the relevant service specifications. Production of the equipment, comprising transmitters, junction boxes, data boxes and thermocouple amplifier units is now in full swing, and deliveries are being made to both Australia and the UK against Commonwealth Government orders. The following is a brief description of the units involved, together with an outline of their respective functions.

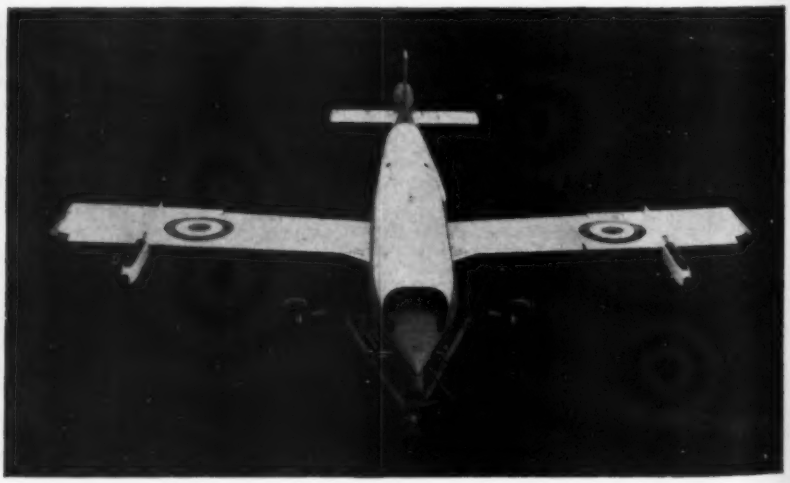
Transmitter F-159-A This unit consists of a pressurized container, measuring 16in × 6in × 6in, with attachments for fitting to a standard tray provided with shock mounts. It has been designed to operate from 22 to 29V d.c. supply, and consumes approximately 2.5A. It comprises a crystal-controlled transmitter, amplitude modulator and a transistorized power supply.

The transmitter has been designed for a total power output of 7W into a 50-Ohm load at a frequency of from 90 to 95Mc/s depending on the crystal selected. The modulator requires an input source of 250mV peak-to-peak, and a resistance of 27,000 Ohms. Modulation may be adjusted to a depth of greater than 90 per cent, but is nominally set at 80 per cent at a frequency of 3kc/s. This results in a response better than ± 1db between the limits of 130c/s and 20kc/s. The power supply provides an output of 300V to both modulator and transmitter. It is a d.c. converter type, comprising a transistorized bridge circuit, with silicon diodes for high-tension rectification. Dropping resistors and a 150V stabilizer are incorporated to provide a high-tension supply for the telemetry junction box.

Junction box F-150-F The junction box provides the interconnecting link between the transducers and the telemetry transmitter. It supplies regulated d.c. voltages (low-tension and high-tension) to the oscillators of the barometric transducers and to its own voltage telemetry units. A motor-driven composite telemetry switch provides low-rate sampling (via microswitches) of data such as fuel contents and engine speed information, and high-speed switching of up to 24 channels from the aircraft auto control equipment. The d.c. sampled signals are converted to a.c. voltages of the required amplitude by the voltage telemetry units and, together with the preset outputs of the barometric and engine-speed transducers, form low-level sub-carriers for the telemetry transmitter.

[*Continued at top of opposite page*

Left, thermocouple amplifier seen with Dewer flask removed. Right, the Jindivik Mk 102B target aircraft, as assembled in Britain by Fairey Engineering



Data junction box F-161-A This unit provides the attenuation networks for reducing auto-control telemetry signals to the required level for sampling and conversion to sub-carriers in the telemetry junction box. In addition, relay circuits provide "on demand" switching of selected data via radio control.

Thermocouple amplifier F-162-A The function of this instrument is to amplify the voltage from the jetpipe thermocouples to a level suitable for feeding to the normal telemetry input. It is housed in a two-part metal case measuring 11.5in × 4in × 4in, containing a thermocouple reference junction and calibrating circuitry in addition to the amplifier proper. The amplifier is a balanced three-stage transistor type which, together with the thermocouple reference junction and the calibrating network, is immersed in an iced-water mixture contained in a Dewer flask. This arrangement minimizes amplifier and reference voltage drift, as well as providing a 0°C reference for the thermocouples. The amplifier can be calibrated in flight at three reference temperatures, on demand from the ground monitor.

It will be seen from the foregoing that Fairey's Australian/Salisbury division has been fortunate in being in a position to gain considerable new experience in the application of advanced techniques to this and other similar target-aircraft instrumentation. This experience could well lead to further interesting activities.

NEW CANADIAN ROCKETS

Now under development by the Canadian Government and Bristol Aero-Industries Ltd of Winnipeg are three advanced sounding rockets in the Black Brant family. They comprise the Black Brant 3, a single-stage, 10in diameter vehicle; Black Brant 4, with 17in diameter first stage and 10in diameter second stage; and Black Brant 5, a single-stage, 17in diameter type. These solid-propellant launch vehicles are designed to carry scientific payloads of 25-250lb to altitudes between 100 and 600 miles.

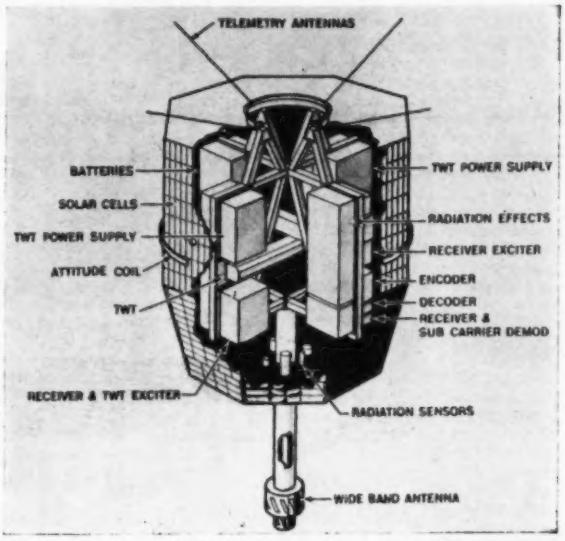
A joint team from the Department of Defence Production, Defence Research Board and Bristol Aero-Industries is responsible for the development programme. Overall control is provided by the Armament Branch of DDP, acting as project manager. The DRB's Canadian Armament Research and Development Establishment is the design authority and is developing the solid propellants, while Bristol Aero-Industries is prime contractor and is carrying out the design and development of the vehicles. Other agencies assisting in the programme are the Defence Research Telecommunications Establishment and the National Research Council.

The rockets will utilize the Canadian solid propellants developed at CARDE and will take advantage of Black Brant 1 and Black Brant 2 experience. Bristol Aero-Industries had been carrying out design work on the new rockets over the past two years as a private venture. The prototype rockets will be launched from Fort Churchill during 1962.

RELAY SATELLITE DETAILS

Ground stations in Rumford, Maine and Nutley, New Jersey, will be utilized in connection with Project Relay, the National Aeronautics and Space Administration's first active repeater communications satellite experiment. As already reported, a contract with RCA is being negotiated for the satellite, which is to be launched by Delta vehicle from Cape Canaveral next year.

The orbit chosen for Relay is elliptical, with 900-mile perigee and 3,000-mile apogee, and is inclined to the equator at approximately 48°. The satellite will be barrel-shaped, 26in in diameter and 29in high, and will carry some 6,000 radiation-protected solar cells. Two communications transponders will be included, each capable of receiving and transmitting television, two-way telephone, or other forms of wide-band data. The transponders will receive signals from the ground on 1,725 Mc/s and, after amplification, will re-transmit to the ground on 4,170 Mc/s by a special ten-Watt travelling wave tube now being designed by RCA.



Cutaway drawing of NASA Relay satellite (see *accompanying news-item*)

In addition to the primary communications equipment, instrumentation will be carried to measure the intensity and distribution of high-level and low-level electrons and protons in the space environment, and to determine the damage caused by these particles to semiconductors such as diodes and solar cells.

A symposium on materials in space technology will be organized by the British Interplanetary Society on November 22. Further symposia on rocket propulsion and rocket devices for planetary investigations are planned for the first half of next year.

Copies of a 1929 paper on *Rockets* read by Mr Paul Adorian to the Engineering Society of the City and Guilds (Engineering) College have been reprinted by the author and are being sold at 8s each in aid of the Henry Tizard Memorial Fund. Copies are available from Mr Adorian at 21 Denmark Street, London WC2.

Twelve companies have been invited by the Space Task Group of the National Aeronautics and Space Administration to submit prime-contractor proposals for the manned lunar Apollo spacecraft. They are Boeing, Chance Vought, General Dynamics, Douglas Aircraft, General Electric, Goodyear Aircraft, Grumman, Lockheed, Martin, McDonnell, North American and Republic Aviation.

The National Aeronautics and Space Administration's Goddard Space Flight Center, Greenbelt, Maryland, has awarded a contract to the Minneapolis-Honeywell Regulator Co for design and engineering services of a space environment facility to check-out and test large spacecraft. Two chambers, each measuring 35ft diameter and 52ft high, should be completed and in operation by October 31, 1962.

Indicative of the scale of US Air Force ICBM programmes is the recent announcement by the Air Force Systems Command that Avco Corporation have been awarded two contracts worth nearly $30m for the continued production of re-entry vehicles for Titan and Atlas. One, possibly concerned with the new Mk 5 vehicle for Titan 2, is valued at $14,980,000 and goes to the Research and Advanced Development Division; the other, worth $14,647,500, is for follow-on production by the Lycoming Division.

An international symposium on space-age astronomy, sponsored by the Douglas Aircraft Co, was held at the California Institute of Technology, Pasadena, during August 7-9.

A two-stage sounding rocket capable of reaching a height of 80km is being developed by Bölkow-Entwicklungen KG. A single-stage version is expected to carry 5kg to 50km.

Martin announce that the TM-76B Mace B tactical air-breathing bombardment missile has been adapted for air transport to overseas theatres. Engineers at Baltimore devised special skids for rapid loading of two missiles aboard a C-124, and in a recent demonstration this operation was carried out in less than 2hr.

Late last month Martin's Baltimore division announced brief details of progress made in a programme of research into explosive forming which has been in hand since January 1960. Considerable success has been achieved in forming large and difficult components in high-strength steels and heat-resisting alloys. It is estimated that major parts will be produced in quantity by explosive methods in about one year.

As part of a long-term programme to evolve large solid-propellant engines, Grand Central Rocket Co at Redlands, Cal, have begun test firings with a propellant known as Polycarbutene-R. Described as "a production liquid polymer of butadiene and acrylic acid, combined with advanced curing agents," the new propellant is mixed with an appreciable proportion of finely divided aluminium. Chamber pressure is held at the low level of under 200lb/sq in, reducing chamber weight considerably. Next step will be test firings of segmented motors of 3ft diameter.

BAC One-Eleven

A CLOSER LOOK AT THE BRITISH AIRCRAFT CORPORATION'S NEW JET SUCCESSOR TO THE VISCOUNT

AN aeroplane may inherit fame, but it still has to win success in an exceedingly competitive world. The fact that the BAC One-Eleven has the brand label of the Viscount will of course open many airline doors. But the aircraft must still sell on its merits in a market that is tougher and more demanding than it was when the Viscount first began to sell, and which is still, despite the Viscount, US-dominated.

The British Aircraft Corporation had many questions to resolve before it settled for the One-Eleven. Market surveys were done, as of course they must always be done. While market research may confirm what should *not* be built, it cannot decide what should be built; it is no more than an aid to management in making the final judgment—the irrevocable judgment that commits a company and everything for which it stands to a new aeroplane.

Obviously, BAC's new jet could not overlap the market covered by the VC10. For a long time—from 1959 until early in 1960—project work was concentrated on the VC11, a machine of about 170,000lb and 130 seats designed for the 1,000-2,500 range-band. Based on the Rolls-Royce Spey (four off) it seemed to appeal to the market, particularly to TCA. But political events at home posed other questions, the answers to which could not be narrowed down by market surveys. The British aircraft industry was being reshaped, and as a candidate for Government support the British Aircraft Corporation's VC11 found itself competing with the de Havilland Trident—or, more precisely, with projected developments of that aircraft. Though this did not itself cause the VC11 to be withdrawn, it was undoubtedly a contributory cause, as was the foothold gained in Europe by the competing Boeing 727, chosen by Lufthansa.

The same domestic events that brought the VC11, rightly or wrongly, into political conflict with the Trident also brought the Hunting H.107 project into the British Aircraft Corporation. Vickers and Hunting, now part of the same family, together breathed new life into this project, concentrating BAC thoughts on the development of a true jet successor to the Viscount. Influence of the 107 project on these thoughts was considerable, and it is appropriate to trace the evolution of the One-Eleven back to the beginnings of the 107.

Hunting's first 107 design study was completed in May 1956. The Bristol Orpheus was, at that time, the only suitable engine available. Serious design work began in November 1957, a mock-up was built at Luton, and low-speed wind tunnel tests were completed. In September 1958 it was realized that turbofan engines then being developed would offer more attractive economics and the 107 was redesigned around two Bristol Siddeley BS.75s. At this stage it was a 48-seater with a range of up to 1,000 miles.

Early in 1960 a report on the Hunting 107 was prepared for the board of Vickers-Armstrongs (Aircraft) Ltd by the Vickers civil aircraft development group. This was shortly after the announcement of the forthcoming integration of Bristol, English Electric and Vickers as the British Aircraft Corporation (January 1960), and BAC's subsequent acquisition of the controlling interest in Hunting Aircraft. In May 1960 a team from Hunting led by the managing director, Mr Arthur Summers, visited Weybridge; a presentation of the 107 was made to a Vickers team headed by Sir George Edwards. From this moment the project went forward as a joint Hunting-Vickers effort.

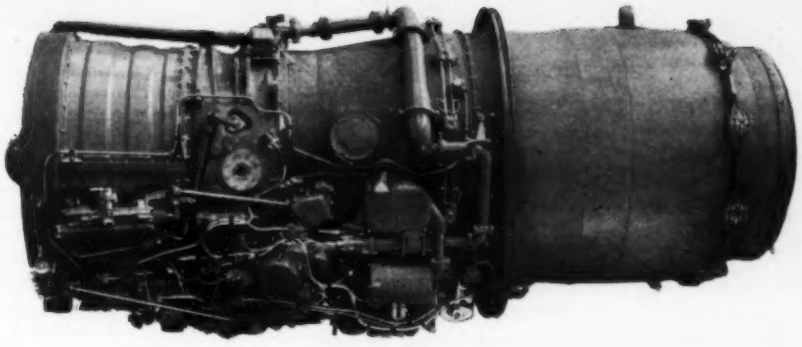
At mid-1960 it appeared that the best hopes for converting the 107 from a project into a firm production aircraft lay in developing it initially as a Valetta/Varsity replacement for the RAF. It was suggested that, in the interests of rapid development, the 107 would be introduced with Orpheus engines and subsequently produced in the more economic BS.75 version. A proposal on these lines to the Government did not meet with a positive reaction, and the project was therefore continued as a civil transport aircraft with BS.75 engines. During this period it was decided to widen the fuselage to accommodate five-abreast seating, as in the Viscount, instead of four as in the original Hunting design, and the position of the tailplane was moved from the middle to the top of the fin.

In August 1960 there was a further presentation at Weybridge at which features of the project in revised form were set out before members of the sales and technical sales departments of Bristol, Hunting and Vickers. This was immediately followed by exploratory sales visits to major airlines all over the world.

These visits were made by a number of British Aircraft Corporation teams and had two main objects: (1) to assess the airlines' interest in a twin-jet airliner in the Viscount/Convair size bracket, and (2) to obtain airline reaction to the engineering and operational features of the aeroplane. Details of the 107 as presented to the airlines were publicly revealed at the SBAC Show in September 1960.

Reactions to the world sales tour were favourable and in the last quarter of 1960 a British Aircraft Corporation design team began to scheme the aircraft in greater detail. A number of changes were made on the basis of airline reaction, including a switch from pneumatics to a conventional hydraulic system. The fuselage cross-section was changed from circular to double-bubble form to meet a requirement for increased freight and luggage capacity. A circular, though larger, cross-section was re-adopted in April 1961.

At the beginning of 1961, as the result of continuous liaison with a number of firmly interested airlines, it was becoming apparent that there were, in fact, two diverging requirements for short-haul



Two Rolls-Royce Spey 505-14 by-pass turbojets power the One-Eleven, each developing 10,400lb static thrust

twin-jet airliners. One group of potential customers accepted the 107 virtually as it stood and placed maximum emphasis on simplicity and low capital cost. The other group liked the concept of the aircraft but required improvements in performance, payload and equipment which would not have been possible within the time-scale offered with BS.75 engines. This latter group of airlines placed greater emphasis than the first group on early delivery and together represented potential orders for a larger number of aircraft.

The possibility was therefore explored of using two more powerful Rolls-Royce Spey engines, as already adopted for the de Havilland Trident, due to fly towards the end of this year.

In March 1961 the twin-Spey version was designated BAC One-Eleven and a technical meeting was held at Weybridge at which agreement was reached on over 50 basic points to be embodied in the design. In mid-March, following a British Aircraft Corporation board meeting, Sir George Edwards set up an organization to spread throughout BAC the overall task of designing, developing, building and selling the twin-jet design powered initially with Spey engines, and the version with BS.75 engines approximately one year later.

The board's decision to proceed with these projects and to begin immediate production of an initial batch of 20 aircraft was stated at a sales conference at Weybridge in mid-April attended by over 60 members of the Bristol, Hunting and Vickers organizations. This decision had been made known to the Government in the previous month.

The sales campaign was made public at a press conference in London on May 9, when the first order was simultaneously announced. This was placed by British United Airways and was for ten One-Elevens, with an option on a further five.

As Sir George Edwards said on this occasion: "This order means that we can now say to customers '*There you are: it is on the go. It is not just one of those things that we will build if you will buy it.*'"

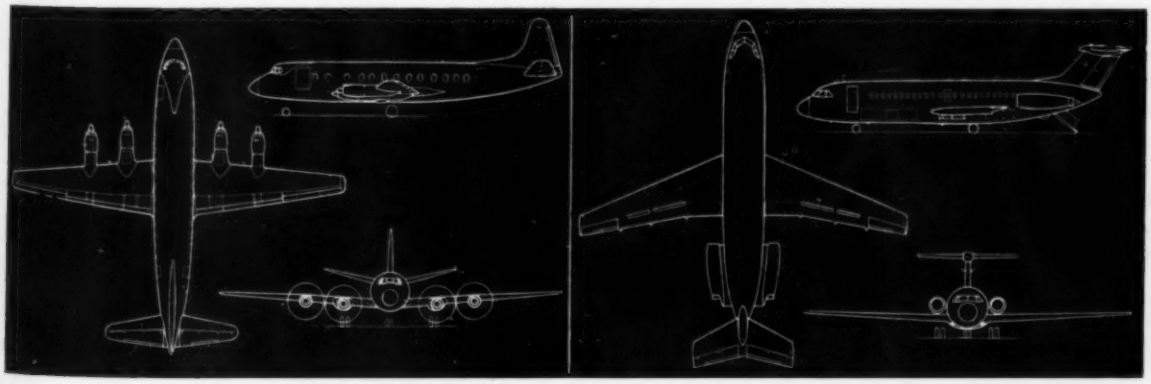
British United, though the first to place an order (and the first British independent ever to be the initial purchaser of a new British aircraft) are not the One-Eleven's sponsors in the same way that BEA were sponsors of the Viking, Viscount and Vanguard, or BOAC of the VC10. But British United's order is as firm as it could reasonably be at this stage. The precise situation was summed up by British United at a recent Air Transport Licensing Board hearing: "BUA has told BAC they are to regard the order as placed. The lawyers have not yet got the contract out; the contract has not yet been signed, but commercially the order has been placed, and BUA would not feel able to go back on it. . . . They have, in the same way, told Vickers they are placing an order for four VC10s and there again the contract has not yet been executed, and when it has been it will contain an escape clause. There will be no escape clause with the BAC One-Eleven." Interest in the One-Eleven has been declared publicly by Continental, Ozark and Frontier (the latter two local service airlines have announced letters of intent for a total of 11 aircraft).

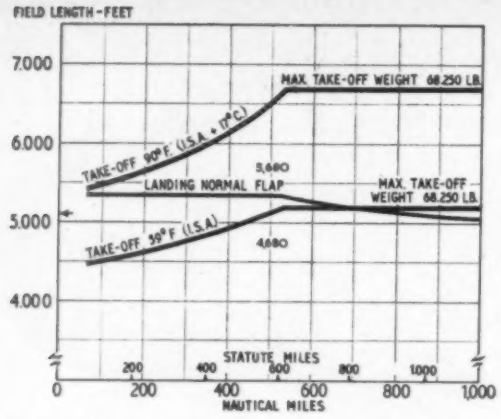
Development and Production Programme

First flight of the BAC One-Eleven is scheduled for the second quarter of 1963 and target date for airworthiness certification is mid-1964, with deliveries to BUA starting in September 1964. The project is the first to be tackled by the British Aircraft Corporation as a unified company. The division of responsibility is worth setting out, because it provides remarkable evidence of the meaning that the aircraft division of the British Aircraft Corporation under the direction of Sir George Edwards has given to the word "integration."

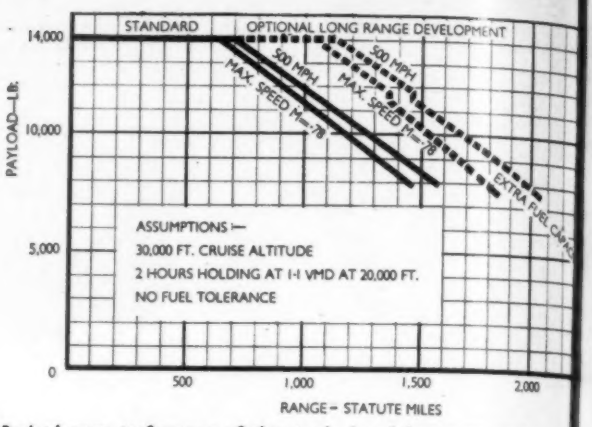
Overall responsibility is carried by Sir George Edwards. Responsible to him for the overall programme is Mr A. W. E. Houghton, assistant managing director of Vicker-Armstrongs (Aircraft). In charge of all aspects of development is Mr Arthur Summers, managing director of Hunting Aircraft. Mr B. Stephenson, director of engineering for Vickers-Armstrongs (Aircraft), has technical responsibility for the project and for obtaining the Design Clearance Certificate. The technical director of Hunting Aircraft, Mr F. Pollicutt, is responsible for technical control and co-ordination of design. Responsible to Mr Pollicutt for the integration of airline requirements in the design is Mr A. J. K. Carline, chief designer, Hunting Aircraft. Among Vickers people working with Mr Pollicutt and Mr Carline on design and development are Mr E. W. J. Gray, chief designer (Hurn), Mr H. Zeffert, chief electrical engineer, and Mr D. Parker, assistant chief engineer, who will concentrate on systems. Mr K. S. Lawson, Vickers' chief aerodynamicist, is working with Mr H. Vogel, his counterpart in

Here, drawn to exactly the same scale, are the Viscount 810 and its jet successor with the same brand label





Take-off field length v. range. Assumptions are: sea level; normal flap settings; maximum payload up to 530 n.m.; high-speed cruising technique; fuel reserves for two hours' holding; temperatures ISA and ISA + 17°C; and BCARs 1959. Under US CARs, landing distance could be reduced by at least 400ft



Payload-range performance of the standard and long-range versions

BAC One-Eleven . . .

Hunting on the aerodynamics side. Responsible for the structural design is Mr K. Bentley of Weybridge. The project group responsible for the basic aircraft configuration is headed by Mr G. Turner of Weybridge under Mr Carline. Chief draughtsman at Weybridge, Mr A. J. Watson, is responsible for standards and drawing systems. In charge of technical sales is Mr D. J. Lambert, assistant general manager (development) of Vickers.

The customer mock-up has been built at Weybridge and there are other systems engineering mock-ups at the appropriate design centres. So far as design is concerned, the Hurn office is designing the front and centre fuselage; Bristol is responsible for the rear fuselage and empennage, Hunting for the wings, flaps and ailerons, and Weybridge for the nose and main wheel undercarriage legs and wing skins. The distribution of production effort has not yet been finally settled (though final assembly will definitely be at Hurn with flight tests at Hurn and Wisley), but the breakdown of responsibility for designing the aircraft probably gives a fair guide to how production will be shared throughout BAC.

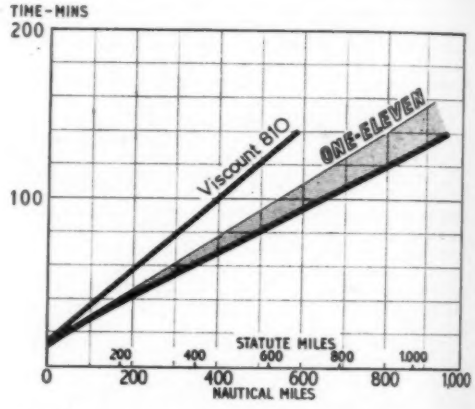
Obviously, the One-Eleven programme represents a major feat of co-ordination and co-operation among people who, in very recent history of the British aircraft industry, were actually rivals. The common sense of purpose and effort is already very apparent; everybody works for BAC; instead of talking about Vickers, Bristol or Hunting, people talk about Weybridge, Hurn, Filton and Luton.

Design work has progressed to the stage where much of the detail has been decided. It is now possible to make a preliminary review of the design in some detail—to set down, in fact, the answers to the questions that the potential customer asks when he gets down to a serious study of the aircraft.

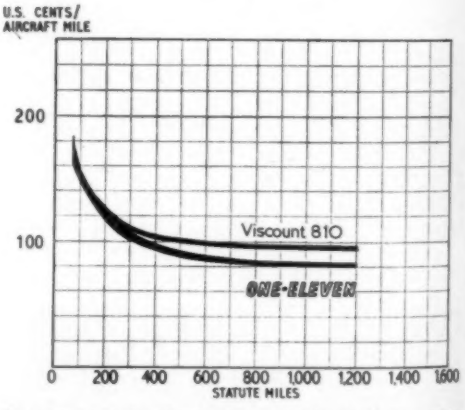
Aerodynamics

Because a high landing weight in relation to take-off weight is a fundamental requirement of short-haul aircraft, wing geometry of the One-Eleven is defined by the landing requirement. An airfield capability of 5,000-6,000ft throughout the world, including the hot and high conditions of the Mid-West USA and the Middle East, have resulted in a gross wing area of 980 sq ft and an approach speed at the maximum landing weight of 65,000lb of 117kt. This is actually about two knots less than the approach speed of the Viscount 810.

An aspect ratio of 8 has been chosen as a reasonable compromise between the requirements of low wing weight, high fuel stowage volume, minimum gust response and the best airworthiness climb performance. The modest sweepback of 20° at the quarter-chord line has been chosen for structural simplicity and the avoidance of sophisticated high lift devices; cruising speed remains sufficiently high for the One-Eleven's block speeds and times to be competitive with those of the big jets over short distances. Sweepback and wing section permit a cruising Mach number of 0.78 (540 m.p.h. at 25,000ft). Optimum operating economy is achieved at cruising speeds near maximum structural design; though this means that the aircraft cruises slightly into the drag rise, it does so with a negligible increase in the coefficient of compressibility drag. The wing thickness/chord ratio varies from 12½ per cent at the root to 11 per cent at the tip.



Block-time comparison with the Viscount. Assumptions: maximum cruising speed technique; ISA; on wind; normal manœuvre allowance



Cost per aircraft-mile comparison with the Viscount 810. Assumptions: ISA; no wind; normal manœuvre allowances. The One-Eleven is seen to be cheaper to operate than the Viscount 810 down to the shortest sectors

Fowler-type rearward-extending landing flaps are fitted for three reasons (other than the obvious one that they are well known and widely used): (1) their high efficiency reduces wing area required to meet approach speed and field length requirements; (2) they provide the most suitable combination of lift and drag to enable the aircraft to negotiate the various segments of obstacle clearance approach and at marginal airfields without excessive or rapid changes of deflection experienced by high-powered twins; and (3) because of the basic characteristics of the Fowler flap motion there

is a considerable latitude in the choice of flap angle to meet either airfield length or airworthiness restrictions.

The most aerodynamically efficient location for the tailplane is on the top of the swept fin, this position avoiding an untidy aerodynamic junction, providing the best tail moment, and keeping the tail clear of wing downwash effects and pitch-up tendencies. The One-Eleven has a moving tailplane to ensure adequate stability at the aft limit and control at the forward limit of the wide c.g. range. It also permits unrestricted loading in all seating configurations.

Performance

The payload-range graph shows that the One-Eleven can carry a payload of 14,000lb for 530 n.m. with reserves for two hours holding at 20,000ft, ISA. At temperatures above ISA, range increases slightly—for example, at ISA + 10°C by 1.5 per cent. The long-range version of the One-Eleven, with centre section tankage and a maximum gross weight of 73,500lb (68,250lb standard version), can carry a maximum payload for 1,020 n.m. under the same conditions.

Clearly, the One-Eleven is a vehicle of roughly the same ton-mile capacity as a Viscount 810, but with the much greater ton-mile per hour productivity that the higher speed confers. Airlines used to planning Viscount schedules should find that the One-Eleven fits neatly into their route pattern; and its Viscount-size capacity, coupled with greater speed, offers the prospect of handling increased traffic at a higher frequency.

Field performance was a fundamental design target and sights were set on ability to use typical secondary airports throughout the world. In standard conditions a 5,200ft runway is adequate for take-off at the maximum take-off weight of 68,250lb. As indicated in the graph, with a reduced payload (10,000lb) and standard temperature, take-off and landing distances become 4,680ft and 5,100ft respectively. With the same payload (10,000lb) and a hotter day (90°F) take-off distance becomes 5,680ft. All this is for a stage length of 530 n.m. with reserves and normal flap settings.

The normal flap setting has the advantage of offering shorter take-off distances at the low altitudes associated with the majority of the world's airports; at high altitudes and high temperatures the intermediate flap setting improves the climb gradient.

With good take-off performance goes low noise level; and the One-Eleven's ability to reach altitude quickly should enable the aircraft to meet the most stringent airport noise requirements.

The One-Eleven has a high forward speed in climb and descent as well as in cruise, making possible ramp to ramp block speeds competitive with the bigger jets and up to 50 per cent faster than the fastest Viscount. As the graph shows, the One-Eleven achieves a higher block speed than the Viscount 810 even over short stages of 200 miles or less. The One-Eleven takes considerably less time than the Viscount 810 over any sector length but on the longer sectors, when flown at maximum range, it actually burns less fuel than the Viscount (including full allowances for ground and air manœuvring). The result is a cost per aircraft-mile lower than that of the Viscount.

Economics

The One-Eleven's low aircraft-mile costs, when added to its design for quick turn-round, produce a vehicle which the makers claim is considerably cheaper to operate than the Viscount 810 down to very short sectors. A measure of the difference is provided by the graph, which shows that only at about 100 miles is the One-Eleven more expensive per mile. Cost/seat-mile of the aircraft, being of comparable capacity, is less than that of the Viscount. Put in terms of passengers required to break even on total costs over a 500-mile stage, the One-Eleven needs 25 at a revenue rate of 7 cents per passenger-mile, or 35 at a revenue rate of 5 cents.

The One-Eleven's economics are likely to prove relatively insensitive to a departure from the optimum cruise altitude, cost being increased by only 5 per cent for a reduction of 10,000ft.

An important partner for the British Aircraft Corporation in the development of the One-Eleven is British United Airways, the first customer, whose executive director, Mr F. A. Laker, is seen on the left. With him is Sir George Edwards, executive director, aircraft, of BAC

AIRFRAME AND SYSTEMS

Flight deck Already in mock-up form at Weybridge, the flight deck is basically designed for two-pilot operation, and it makes the most of the simplicity and extra room afforded by a twin-engined configuration. A third crew member's position is provided in a "jump" seat and there is space available also for a supernumerary or check pilot. The first and second pilots' seats are accessible from around the outside.

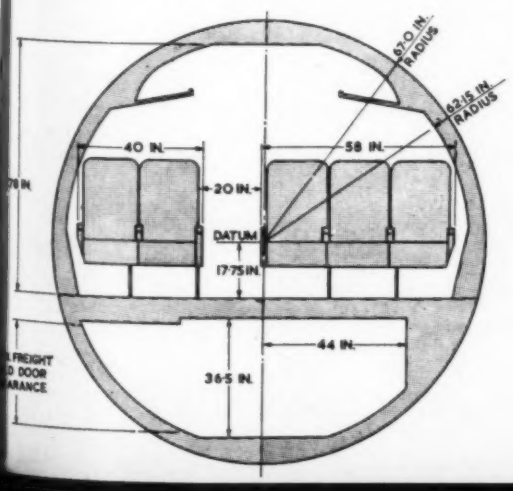
As anyone who sits in the mock-up can verify for himself, all-round visibility is excellent; there are six large glazed panels, deep enough to obviate the need for "eyebrow" windows. General layout conforms to the latest SAE requirements and all recommended contemporary standards. Presentation of the systems and flight instruments has been developed with IFALPA recommendations, as well as standard airworthiness requirements, in mind. All controls for the engines, undercarriage, flaps, radio and systems are within reach of both pilots.

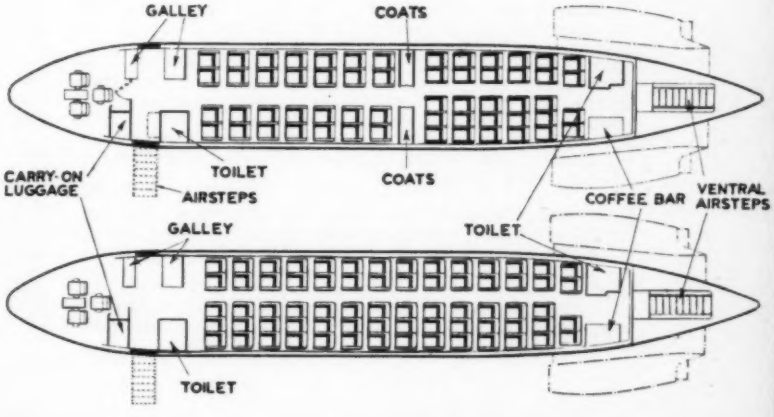
Structure The structural engineering experience that has gone into the Viscount, Vanguard, Britannia and other BAC aircraft has, needless to say, been designed into the One-Eleven. General structural strategy is, basically, low stress levels and fail-safe multi-load paths backed by thorough testing. Material is of copper-based aluminium alloys and the integral machining techniques developed for the Vanguard and VC10 wings have been applied. The wing has three shear webs and integrally-machined skin-and-stringer panels, basically the same as the Vanguard and VC10. The bottom tension panels are of 24ST4 material, and the material of the top compression surface is of DTD 5020. The structure is sealed to form integral fuel tankage, with easy access for inspection, and the centre section has been designed to take extra fuel for the long-range and executive versions.

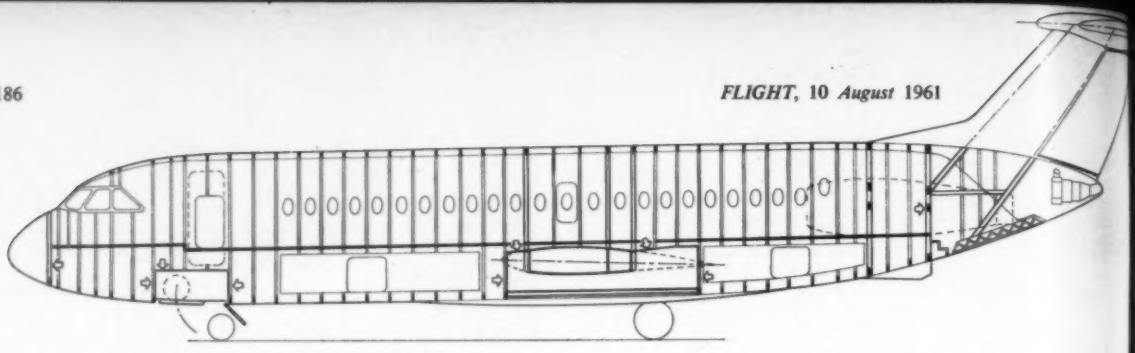
Tailplane and fin are of conventional sheet with stringers attached by rivets.

Frames and stringers are continuous throughout the fuselage; channel section frames at 20in pitch are cleated to the skin and

The One-Eleven's cabin is wider than that of the Viscount, and is parallel-sided for all but the last seat-row of its length. Below are illustrated the mixed-class version (upper plan), with 28 four-abreast first-class seats at 38in pitch and 29 five-abreast economy-class seats at 36in; and the all-economy 69-seat 37in-pitch five-abreast layout (lower plan). The cross-section on the left provides the essential cabin dimensions







Frame stations and basic fuselage structure stem from the now generally accepted airline requirement for close-pitched passenger windows

BAC One-Eleven . . .

support Z-section stringers at approximately 5in pitch, flush-riveted to the skin. Hoop stresses are 9,800lb/sq in maximum. The doors are outward-opening on parallel linkage and are of the plug type.

Systems Because of the high integrity demanded by short-haul operations, with frequent take-off and landing, emphasis has been put on the choice of proven components with the widest airline experience. The forward fuselage underfloor area contains an equipment bay for electrical, radio and electronic equipment, separated from contamination by galley or toilet equipment. By duplication of the major system supplies the design provides the safeguard of mutual protection. Both halves of each system are normally in continuous operation, so that if one half fails the other half continues to provide for all essential services.

With an eye on quick turn-round the designers of the One-Eleven have paid close attention to self-sufficiency on the ground; an a.p.u. is provided for ground conditioning, engine starting and operation of electrical systems without the use of external power.

Flying controls Except for rudder control, which is power-assisted, the flying controls are manually operated by cables, main control surfaces being aerodynamically balanced and operated by spring tabs, Viscount-style. The tailplane is of adjustable incidence, operated by duplicated hydraulic motors. Lateral aileron control is assisted by hydraulically-operated spoilers which can also be used as airbrakes. The flaps are hydraulically-operated and are of the three-piece Fowler type.

BAC ONE-ELEVEN

Two Rolls-Royce Spey 505-14 By-pass turbojets of 10,400lb static thrust each

Dimensions: Span, 88ft 6in; length, 92ft 1in; height, 23ft 9in; wing area, 980 sq ft.

Weights: Max ramp weight, 68,550lb; max take-off weight, 68,250lb (standard aircraft), 73,500lb (long-range version); max landing weight, 65,000lb; max zero fuel weight, 58,000lb; typical max payload, 14,000lb.

Payload accommodation: Freight volume, 500 cu ft; cabin accommodational length, 58ft 9in (including amenities), 44ft 6in (seating area); max interior width, arm-rest height, 10ft 4in; seating accommodation, see diagrams on page 185.

Fuel capacity: Max normal capacity, 2,250 Imp gal (2,700 US gal); optional additional centre section tankage, 850 Imp gal (1,020 US gal).

Performance: Max cruising speed, 540 m.p.h. (470kt) at 25,000ft; corresponding fuel consumption at 65,000lb all-up weight, 0.0875 nautical air miles/lb; max design speed, Mach 0.78; take-off field length, max t/o. weight (68,250lb) in standard conditions, 5,300ft (see also text); landing distance, with max payload and typical reserves at 62,000lb landing weight with a 60 per cent runway factor, 5,550ft; payload-range performance, see graph, page 184.

Hydraulic system There are two completely independent systems providing a working maximum pressure of 3,000lb/sq in, each with its own reservoir. The system is designed for the use of Skydrol 500A fire-resistant fluid. Pressure lines are of stainless steel and return lines of light alloy. Hydraulic power is used to operate the landing gear, flaps, spoiler/airbrakes, tailplane-incidence, nose-wheel steering, ventral stairs, brakes, elevator feel, rudder boost and tail bumper. One system incorporates an electric pump which will ensure normal undercarriage retraction in the event of engine or pump failure during take-off.

Fuel system Integral wing tankage accommodates 2,250 Imp gal (2,700 US gal). Provision is made also for a further 850 Imp gal (1,020 US gal) in the centre section.

Electrical system Two Westinghouse constant-frequency a.c. generating channels are employed, the basic system comprising two constant-speed units driving 30Kva brushless generators which in turn supply two individual a.c. load bus-bars. The d.c. outputs are from two 150A rectifiers connected to a common d.c. bus-bar.

Combined air system Compressor bleed air from each engine is led to a separate air system to provide airframe anti-icing and cabin air conditioning. Under normal circumstances cabin and flight deck are each conditioned by a separate system, but in the event of an engine or system failure the remaining system can supply both areas. Temperature control is provided by regulating the proportion of bleed air allowed to pass through the refrigeration system. Cabin pressure can be regulated up to a maximum of 7lb/sq in.

The twin air systems also supply hot air for anti-icing of the wing, tailplane and fin leading edges, and ensure that the ventral stairway remains free of ice. Either system will provide for the entire aircraft in the event of failure of one. Engine intakes are protected from ice by a separate engine compressor bleed.

Payload accommodation The BAC One-Eleven is the first British airliner to have a rear ventral passenger door, which incorporates a hydraulically-operated stairway. There is also a conventional door at the forward end of the fuselage, incorporating airsteps if required. One advantage of the ventral door is that it wastes the least internal cabin space. The maximum seating accommodation, five-abreast at 37in pitch, is 69, although it is believed that a 73-seat version is planned for BUA. The diagrams show the 69-seat all-economy layout, and a typical mixed-class version with 28 four-abreast first-class and 29 five-abreast economy-class seats.

The One-Eleven is designed for maximum interior flexibility to cater for a wide variety of passenger arrangements. This is facilitated by (1) constant and circular cross-section of the majority of the 54ft of length available for accommodation, (2) track-mounted seats and bulkheads, and (3) a wide c.g. range. Interior width is 124in at elbow level, which is 4½in wider than the Viscount at its widest. The One-Eleven was designed from the outset with two-class operation in mind and there are separate passenger entries and separate amenity areas at each end of the cabin.

The windows are vertical ellipses 14in × 9in and set at 20in pitch, giving approximately two windows per seat row. Door dimensions are 3ft 6in × 2ft 7in (forward) and 3ft 6in × 3ft 3½in (aft). A total of 500 cu ft capacity is available for freight in two class D luggage holds, 320 cu ft forward and 180 cu ft aft with doors respectively 3ft × 2ft 7in and 3ft 1in × 2ft.

Powerplant The Rolls-Royce Spey 505-14 (a re-designation of the RB.163) is rated at 10,400lb static thrust. By-pass ratio is 1:1; pressure ratio, 16.7:1. Specific fuel consumption at a Mach number of 0.78 at 25,000ft in ISA conditions, and using the maximum recommended cruising power, is 0.776lb/hr/lb. The engine was described in *Flight* for May 18, 1961. J. M. R.

First British airliner with a rear ventral passenger entrance

BRITISH UNITED AIRWAYS CHOOSES

THE SHORT HAUL JET

BAC ONE-ELEVEN

TWO ROLLS-ROYCE SPEY TURBOFAN ENGINES

JET SUCCESSOR TO THE VISCOUNT
WITH EVEN BETTER THAN VISCOUNT ECONOMICS

- 540 m.p.h. cruise speed
- 57 mixed class or 69 tourist passengers
- Short airfield performance
- Quick turn-round: built-in auxiliary power unit
- Cabin width for spacious five-abreast seating
- Range of over 1,100 miles with full 14,000 lb payload

BRITISH AIRCRAFT CORPORATION

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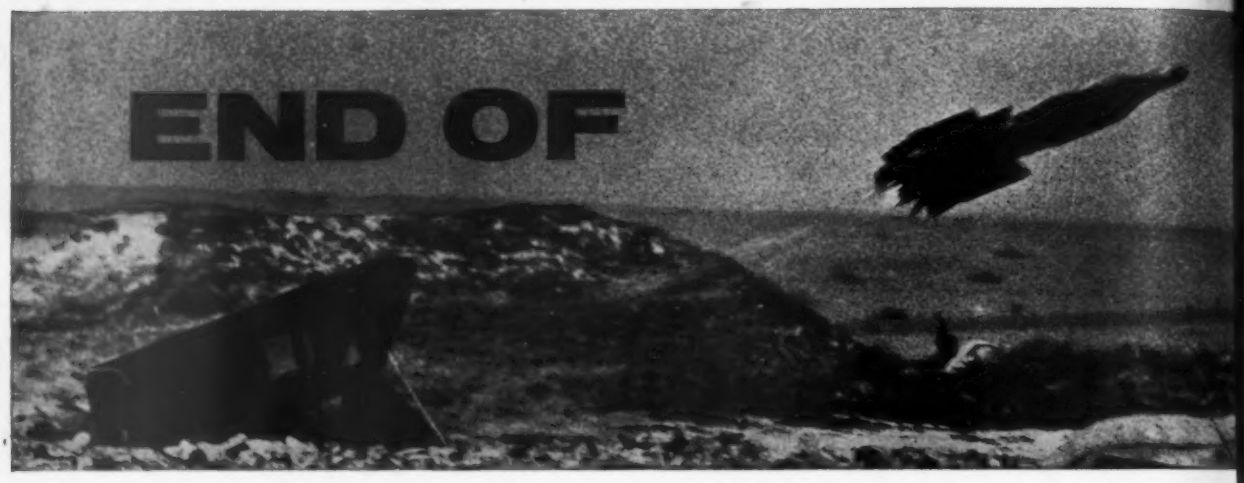

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VIGILANT SCORES AGAIN

On July 7th at Warminster, a large audience of Nato Military observers and press correspondents saw Vigilant:

- **Score 12 hits in 13 shots**
- **Successfully engage moving tanks at ranges out to 1350 yards**
- **Hit 4 oncoming tanks in 48 seconds, the attack being spread over a 40 degree arc**

On May 12th 'somewhere in Europe' other Military observers saw Vigilant:

Score 11 hits out of 13 shots

Hit 'crossing' tanks moving at 25 mph

Hit a tank at less than 200 yards

Hit tanks making snap appearances of 15 seconds and 20 seconds

, mo ethal and most accurate one-man anti-tank missile in the world

any of

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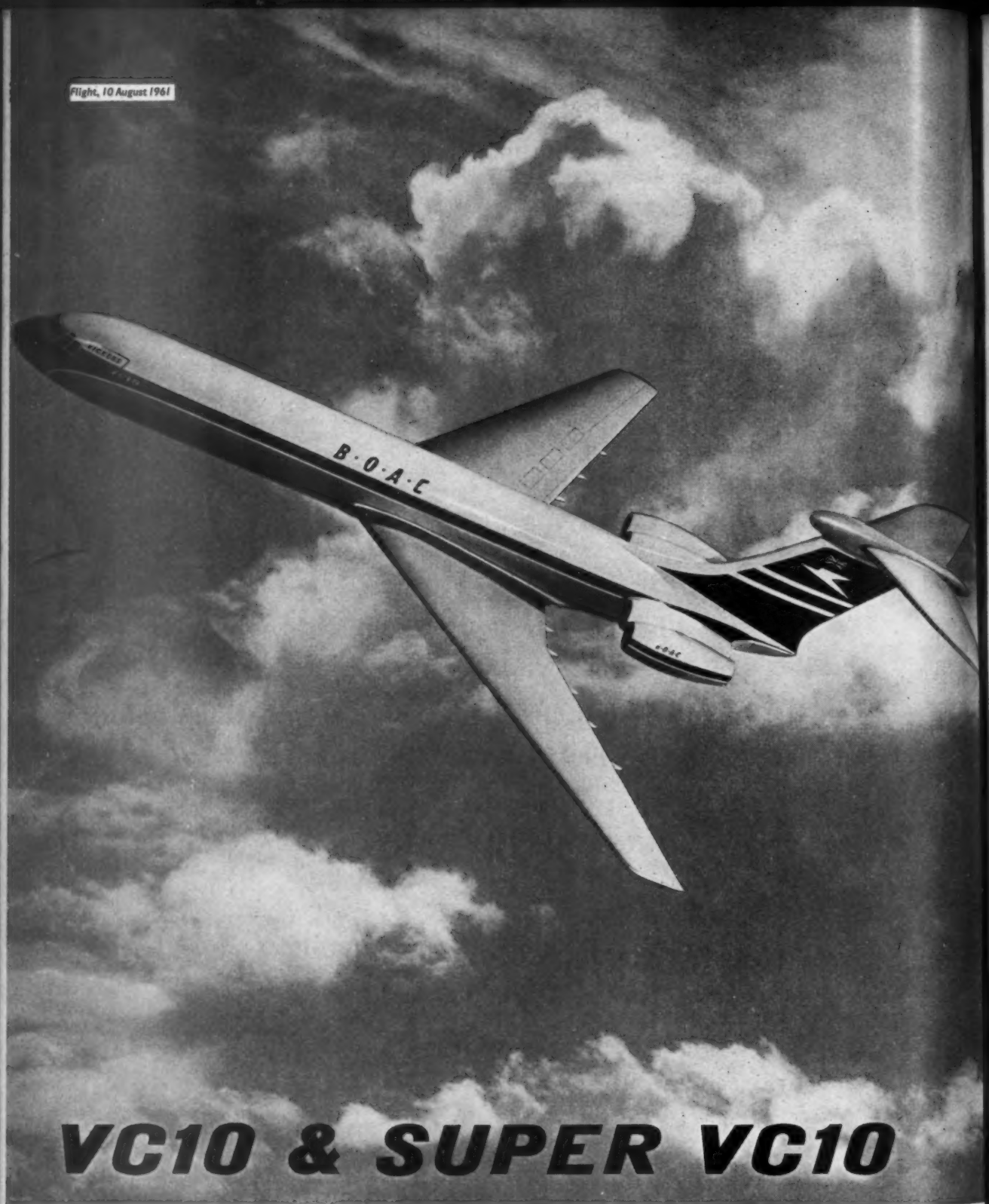
BVW.3



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TGA BVC10

FLIGHT SYSTEM SURVEY

Smiths Apply ATR Casing

DURING the SBAC Display last year Smiths Aviation Division exhibited components of the new electronic equipment cases they had developed to American ARINC specification No 404 and British ATEC specification 201. The components and appropriate mounting trays can now be bought "off the shelf" for any of the standard boxes up to 1ATR, in both short and long versions.

In the aircraft, the assembled electronic box is supported in the mounting tray secured to cross-rails which are shock-mounted on the airframe structure at spacings recommended by the aircraft manufacturers. The boxes are not individually shock-mounted. Electrical connections are made by multi-way plug sockets at the rear of the case which mate with equivalent units on the tray. Dowel pins align the connectors and are also positioned to prevent insertion of the wrong box. It is now widely accepted that the British Standards Specification BSR.1 is obsolete; accordingly, British manufacturers have largely adopted ARINC form factors. ATR shapes and sizes can be mounted closer together, are easy to remove for maintenance and lend themselves well to modern production techniques, particularly those using miniaturized modules.

Smiths have applied the ATR sizes extensively to their system packaging, and they make what is probably the largest single application of ATR equipment—American or British—in the multiplex automatic flight-control system for the de Havilland Trident. All the electronic units of this system will be packaged in accordance with ARINC Spec. 404, using Smiths' own hardware. In addition, the Trident radio, navigation and electrical units contained in other manufacturers' ATR cases will be carried in Smiths ATR mounting trays and associated junction boxes.

The provision of a set of standard components from which boxes of various ATR sizes can be assembled has already made possible an appreciable reduction in cost and man-hours within Smiths Aviation Division itself. Without standard cases, considerable time must be spent on the design of boxes in a number of different departments. The Smiths boxes are so arranged that, on removal of the covers, electrical and mechanical components, cable forms and connectors are all fully accessible. Base-plate assemblies and top channels allow for use of full-size chassis and modules, either separately or in combination.

Extruded aluminium sections are employed wherever extra strength is needed; and maximum longitudinal stiffness is inherent from fixings in two planes at front and rear panels. Normal ventilation from bottom to top is ensured by perforated base-plates and covers made of simple, one-piece pressings in light alloy, pierced all over with a mosaic of ¼in holes. A ¾ATR cover made from 0.036in-thick material would have 2,500 pierced holes, giving a seven per cent saving in weight.

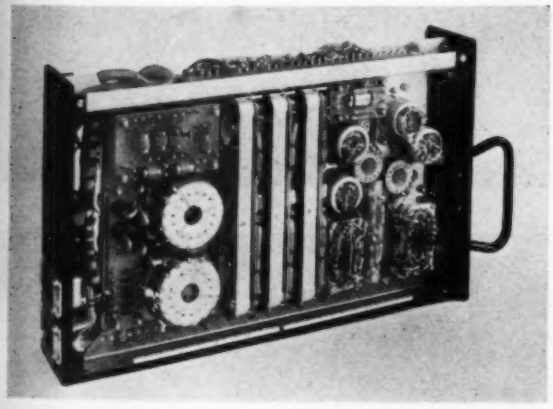
Smiths have developed special junction boxes which can be removed from the top of the mounting tray, even when the tray is situated on the bottom shelf, without damaging the wiring. Junction boxes can also be joined together into "families," reducing the number of wires run externally along the rear of the racking. Indexing pins on each box can be interchanged with blanking screws to make any combination of indexing listed in the ARINC specification.

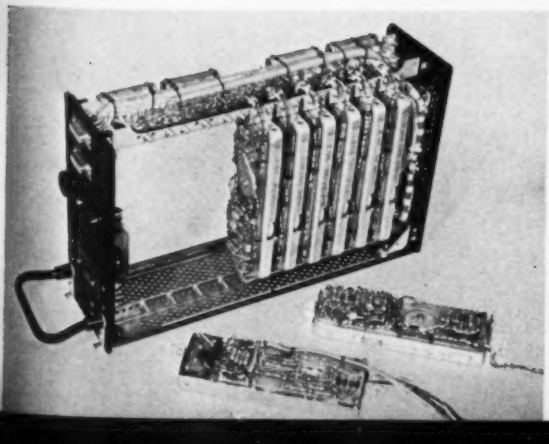
The three pictures below show some of the units of the Trident flight control system in Smiths ATR cases. The flight compass amplifier is mounted in a short ¼ATR case. The electronic unit of the master compass, not shown, is mounted in a short ¾ATR case which is subsequently bolted end-to-end to the presentation unit to form a single long ATR case. The PVD amplifier, shown below, has lightening holes in the base-plate and end cover, as well as perforations in the top cover, to allow virtually unrestricted flow of ventilating air through the case from bottom to top. One picture shows the three tiers of junction boxes which will connect the cases of the Trident flight control system. Behind them is the large black case of the main junction box for the whole system.

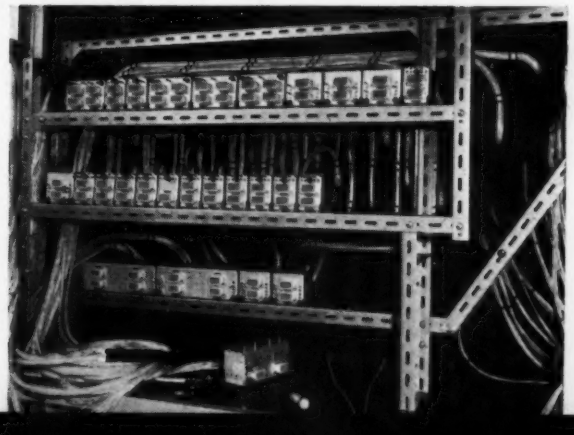
Decca roller map 9273, left, and 9267, above. They are respectively manually set and Doppler-controlled

Decca Roller Maps

Two examples of pictorial roller-map devices proposed by Decca for military aircraft not equipped with Decca Navigator are illustrated above. Intended for dead-reckoning and track-keeping in strike aircraft, they are small and light; and one of them can be placed in front of an instrument panel and used with manual information inputs only. The rollers will accommodate up to 4,800 miles of "one-million" topographical map strip on which a pointer shows lateral track displacements. Groundspeed and lateral displacement are manually set on one roller map or coupled to Doppler on the other type. Trials have proved, it is stated, very successful.

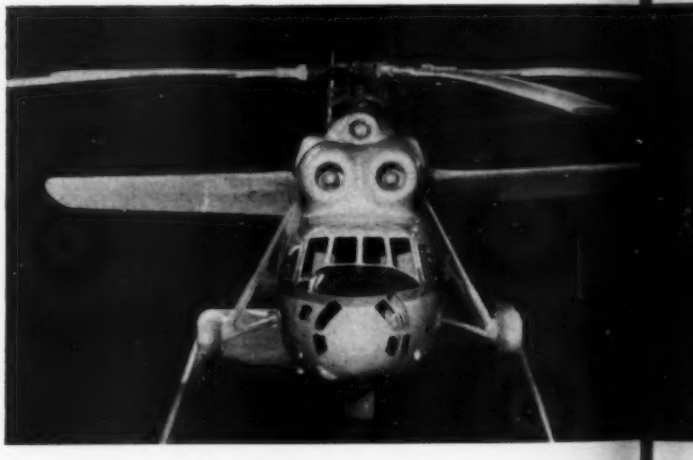






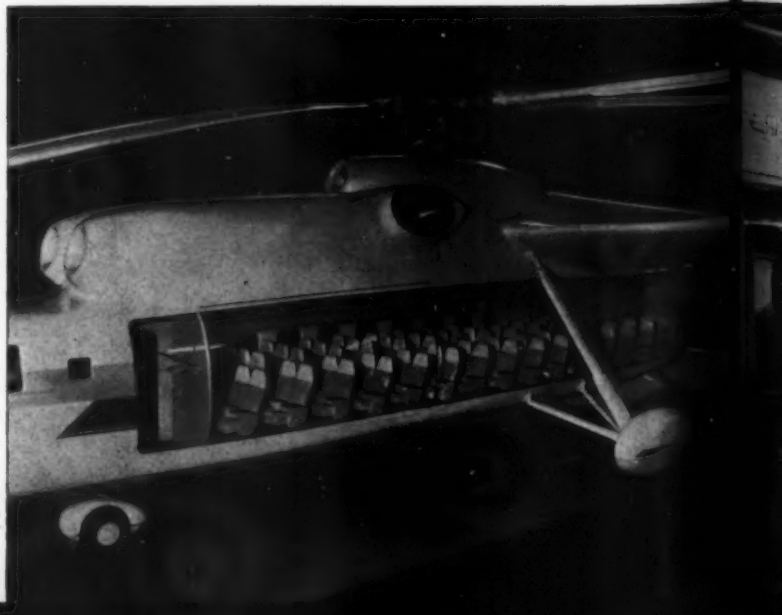
Smiths ATR cases applied (left, upper and lower) to the PDV amplifier and flight compass amplifier. Below are the junction boxes, with the main junction box behind, for the flight-control system of the Trident, mounted in the final assembly jig

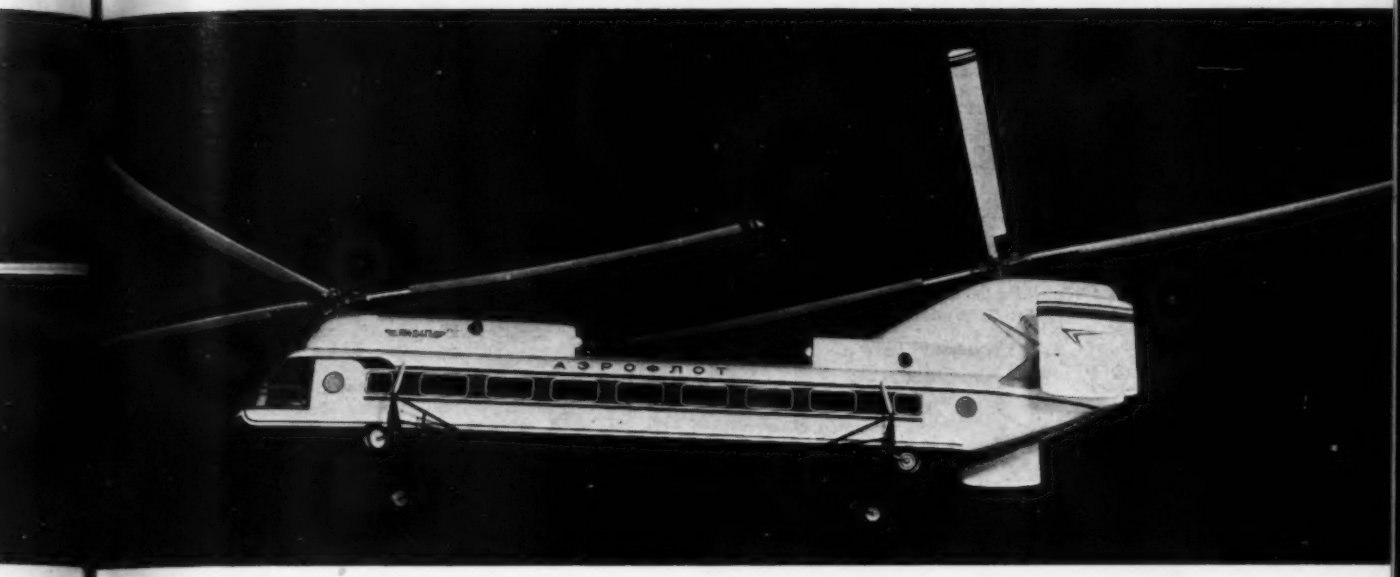
RUSSIA'S HELICOPTER AI



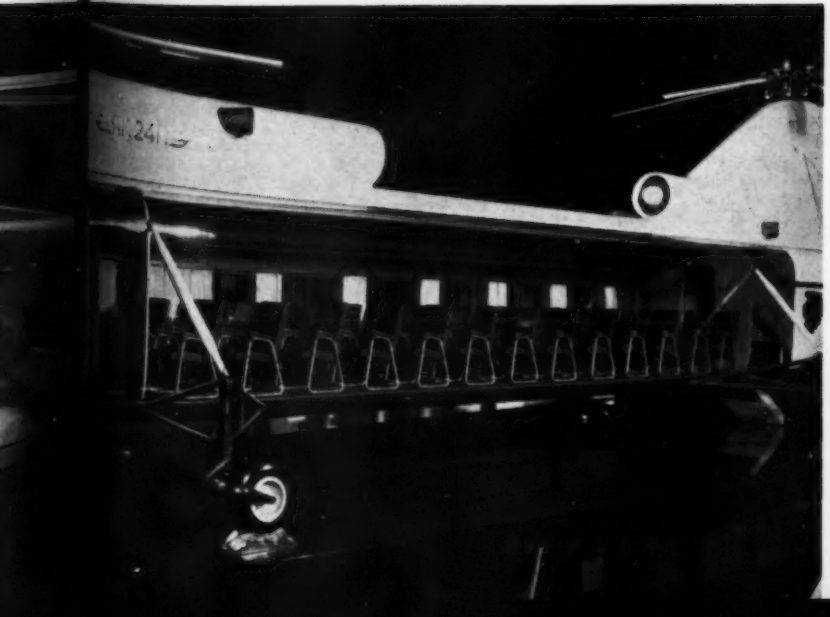
Mi-6

One of the models most admired at the recent Soviet Exhibition at Earls Court was that—illustrated on this page—of an Aeroflot version of the Mi-6 helicopter. Accommodating over 70 passengers in five-abreast seats, this, the world's largest VTO airliner, has a rear-entry door, as seen in the picture immediately above. Take-off weight of the Mi-6 is said to be about 43 tons. Maximum speed is of the order of 186-200 m.p.h. and cruising speed 167 m.p.h.





PTE AIRLINERS compared in "Flight" Photographs of Models



Yak-24P

Illustrated on this page in views comparable with those of the Mi-6 opposite is the new civil, turbine-powered development of the Yak-24, designated Yak-24P. This version seats 39 passengers and is a development of the Yak-24K, already in Aeroflot service and powered with two 1,700 h.p. piston engines. A point of particular interest is the rearward-facing intake for the forward of the two gas turbines. As on the Mi-6, rear passenger-loading is a feature.

THE advertising methods employed by America's leading airlines have been undergoing a subtle change. Emphasis has shifted from the traditional highlighting of "most modern," "fastest," "newest" (etc., etc.) aircraft to rhapsodies over unique passenger-handling services. Passengers are reminded that their baggage will be carried on the same aircraft as themselves and speedily off-loaded on arrival. It is also being advertised (albeit seldom proven in practice) that it will be treated gently. Some airlines, too, are mentioning simplified check-in and reservation procedures.

One of the reasons underlying this change of policy is that all the American big jets are virtually indistinguishable from one another, at least in so far as external appearance is concerned. Few ordinary passengers can detect the configuration differences between the 707, DC-8 and 880 jets. (By contrast, the Vickers VC10 should create something of a stir at American airports.) Several of the big airlines prefer to publicize their jet aircraft by some trademarked name. American Airlines' Boeings and Convairs are called "Astrojets"; TWA have named their fleet of 707s and 880s "Superjets"; and Pan American call their 707s and DC-8s "Jet Clippers."

Filling those Seats

US AIRLINES TRY NEW PUBLICITY BAITS TO LURE THE PASSENGER

By DON ADAMS (New York)

Perhaps a more significant reason for the changing advertising practices is that the airlines are becoming increasingly aware that they must sell the public something beyond "newest" and "fastest." These two superlatives helped to raise air travel from the level of an uncertain adventure to its established position today as a major means of transportation; but now every US citizen knows he can pretty well travel from coast to coast in the time it takes for his spouse to drive home from the airport.

The airlines' new attitude, which is welcomed by many, has been occasioned by the simple problem of having to fill an ever-increasing number of seats. Heartily condemning the regulatory agencies, the airlines have contended that their present dilemma is the result of inadequate planning by Government officials. According to some airlines, too many operators have been certified for the prime routes.

But there are also more basic, if less willingly admitted, reasons for the airlines' financial plight. It was suggested in a *Flight* article a year ago that the airlines had simply been buying too many aeroplanes with too many seats. This same view has been echoed by many others. Another reason for the present difficulties is that the airlines have for years fought one another for the same customers—executives travelling on expense accounts, and the money-no-object class in general. Little effort has been spent on winning converts to air travel from the largest segment of the population, the average middle-class citizen for whom air travel is too expensive.

Will the new "common touch" advertisements increase travel? No, for again the airlines will still be fighting among themselves for identically the same market. The new policy is better than the old one; but there is an even surer way of getting passengers to travel by air—and that is simply to reduce fares. Already a trend in this direction is noticeable. It would not be surprising if within the next year a majority of the present passenger market turned away from first-class service and to tourist- or economy-class services. The tourist-class accommodation in the big US jets is certainly adequate enough for all but the most finicky traveller. First-class load factors are thus likely to experience a sharp drop.

That the general public is interested in low-fare air travel is apparent from the steady increase in the number of readers' letters on the subject published in leading American periodicals. The Airways Club, which is a growing organization that represents the customer's point of view, recently lodged a complaint about transatlantic fares. Observing that during April there were 349 scheduled flights across the ocean, and that of these only 26 were flown by piston-engined equipment, the club argued that the jet surcharge has become a built-in fare increase.

It will be remembered that the jet surcharge was originally proposed to prevent a complete loss of traffic by those carriers who had not yet received their jets. Now, however, with everyone operating jets, the surcharged fare has become almost the standard fare, and it is frequently listed as such in time-tables. The text of the Airways Club's latest complaint to the CAB, released recently, is of some interest. The following is part of their letter to Mr Alan S. Boyd, CAB chairman:—

"The IATA-approved transatlantic fares now in effect provide economy and first-class fares between gateway points in the United States and gateway points in the British Isles and Europe. Economy-class fares apply to piston or jet-prop aircraft. Economy-class fares for transportation in pure jets require a sliding-scale surcharge depending on the one-way first-class fare. This presumes the public has a choice of travelling economy-class in piston aircraft without paying the surcharge, or in jet aircraft with the surcharge added.

"Our member reports that it is virtually impossible to get reservations on a propeller aircraft this summer in order to avoid paying the jet surcharge.

"A preliminary survey of the April Official Airline Guide reveals there will be a total of approximately 349 weekly schedules via IATA carriers between United States and Europe/British Isles gateway points at the peak of this summer. Of this total, 26 weekly schedules, or about seven per cent, will be flown with aircraft on which jet surcharges are not applicable. Only five carriers (British Overseas Airways Corporation, KLM, El Al, Trans World Airlines and Pan American World Airways) appear to provide any prop aircraft; all the others will fly only jet aircraft.

"The Airways Club, and others, have been concerned that the surcharges are really not what the name implies but are, in effect, built-in added fares. It this were not so, all carriers would provide adequate to-choice equipment.

"It is our pointed conviction that jet surcharges are deceptive in that the public is not afforded an adequate choice between schedules which require surcharges and those which do not.

"In communicating with our members, we feel this situation is comparable to a public display of 'good' and 'supergrade' toothpaste, at relative prices. The public would take a dim view if there were no 'good' grade available (or virtually none) for sale, and would feel they were being forced to buy the higher-priced article."

The club's views make good sense. It is amusing to recall that when the surcharges were first suggested the airlines scoffed at those who insisted that, like most taxes, they would never be repealed.

Some speculation here is worthwhile. Since the public did not abandon the non-jet airlines in the early jet-age days, is it possible that the surchage was in fact sufficient to keep some people off the jets and on the pistons? Perhaps the public is truly interested in low-cost services, irrespective of the equipment used—so long as it is safe. It would be interesting to examine the load factors on today's piston flights and to establish from the passengers why they chose piston flights. If many of them did so because of the lower price the fact would have tremendous implications on the pattern of future airline equipment plans.

James M. Landis, the former head of the CAB who is now Special Assistant to the President, recently went on record with some pertinent comments. The writer had complained about the cartel-like actions of IATA. In reply, Mr Landis made the following statement in a letter to the *New York Times*:—

"There is no doubt but that the International Air Transport Association is in the nature of a cartel or trade conference establishing international air fares, and adherence to it or joining in any fare actions that it proposes would probably be in violation of the anti-trust laws, except for the fact that the Civil Aeronautics Act permits American carriers to do so if they have the approval of the Civil Aeronautics Board."

The public has long *expected* low fares, but it is clearly not getting them. Perhaps it is now time it *demanded* them.

BOOK REVIEW

The Pen and the Air

RECENT CONTRIBUTIONS TO AVIATION LITERATURE REVIEWED BY HUMPHREY WYNN

IF you had within arm's reach a dozen or so of the right sort of aviation books, you could become tolerably well informed, in an afternoon's reading, about aeronautical progress in the world's most dramatic, spluttering, cataclysmic half century. You would be surprised, as you read, to realize that within your own lifetime (if that happens to be, say, sixty years) so much has happened, from the first teetering steps in getting airborne to rocketing a man into outer space and recovering him, from firing at your enemy from the cockpit with a revolver to destroying him invisibly with a homing missile.

It so happens that aviation books published in the past few months cover just such an historic gamut, from the brilliant conceptions of Sir George Cayley to the DH Comet's jet airliner début, from the far-sightedness of J. W. Dunne to the philosophic introspections of Saint-Exupéry, from the gallantry of Ball and Bishop to the calculated daring of Gibson, Cheshire and Doolittle: you will find all these facets within recent volumes.

Not only because of the importance of its subject but equally because of the worthiness of its treatment J. Laurence Pritchard's **Sir George Cayley** (*Max Parrish & Co Ltd, 55 Queen Anne Street, London W1. Illustrated, 42s*) should head your reading. Historically, of course, it takes precedence: Cayley was one of the great men of the 18th/19th century, an English Leonardo da Vinci in his imaginativeness and curiosity and like the industrious Benjamin Franklin interested in all things scientific and mechanical. Only recently have Cayley's brilliant prognostications begun to receive their due, and this is his first full-length biography. It is entirely worthy, detailed, stylish and authoritative, a fitting tribute to one of aviation's founding fathers.

Like all great sciences, aviation has such wise men and prophets as Cayley: what makes it so unique is its wild boys, its dashing pioneers who contribute as much as the men on the Mt Sinai heights or in Rutherford Laboratory recesses. Such a pioneer was Claude Grahame-White, who made so gallant an attempt to win the 1910 London - Manchester race and cradled so many pilots at

his Hendon flying school. His story is told in **Claude Grahame-White,** by Graham Wallace (*Putnam & Co Ltd, 42 Gt Russell St, London WC1. Illustrated, 35s*). What strikes one is the extraordinary brevity of Graham-White's aviation career, for he sold Hendon Aerodrome about 1927 then lived in retirement in the south of France until his death a couple of years ago.

At about the same time that Grahame-White was teaching people to fly at Hendon, a few miles to the north, at Hatfield, young Geoffrey de Havilland was building and flying his first aircraft and engines, his endeavours crystallizing into the Aircraft Manufacturing Co. Martin Sharp, who is public relations manager of its successor the de Havilland Aircraft Co, has done well to call his account of its growth **DH: An Outline of de Havilland History** (*Faber & Faber Ltd, 24 Russell Square, London WC1. Illustrated, 42s*), because it is by these two famous initials that the great company is known the world over: in this book Mr Sharp has shown himself a worthy chronicler of its achievements.

Quite different in treatment is John Pudney's small 50th anniversary commemorative volume on another great concern, the Bristol Aeroplane Co. **Bristol Fashion** (*Putnam & Co Ltd. 12s*), with delicate drawings by David Gentleman, is a novelist's-eye view of the West Country business which began by building trams and is shortly to test the first all-steel aeroplane. Bristol and de Havilland are but two strands in the complex tapestry of British Aviation. Down-under, perhaps, things are less complex: Stanley Brogden has undertaken the whole story, civil and military, and his

History of Australian Aviation (*The Hawthorn Press, Melbourne. Illustrated, 35s*) deals comprehensively with aeronautical events in the great sub-continent, from the pioneer Dr William Bland to rocket-testing at Woomera.

No aircraft industry could get far without its test pilots, and in **Testing Time** (*Cassell & Co Ltd, 35 Red Lion Square, London WC1. Illustrated, 30s*) Constance Babington Smith has dealt in her stylish and thorough fashion with British test-flying: a worthy book on a worthy theme, with a title as neat as that of her previous book **Evidence in Camera,** now issued in a Penguin edition at 4s 6d.

Peacetime progress is comparatively slow: it is war, with all its horror and destruction, that accelerates development and brings in advances which ultimately benefit individual nations and mankind as a whole. There are several books among recent publications which deal with aircraft in two world wars and with the men who flew them. The *Ian Allan Organization* (*Craven House, Hampton Court, Surrey*) recently produced three more of its useful half-crown reference books, two of them by K. G. Munson—**British Aircraft of World War Two** and **Enemy Aircraft (German and Italian) of World War Two**—and one by John W. R. Taylor, called **Royal Air Force.** Mr Taylor is well known to readers of *Flight*, as is Dennis I. Punnett, whose drawings appear in William Green's small but comprehensive book, **War Planes of the Second World War: Fighters, Vol II (Great Britain, Italy)** (*Macdonald & Co Ltd, 16 Maddox Street, London W1. 9s 6d*).

If you should wish to read more about the fighting airmen of the world wars, among recent publications there are the 1914-18 era study **The Years of the Sky Kings,** by Arch Whitehouse (*Macdonald & Co Ltd. Illustrated, 25s*) and the 1939-54 account of some of the outstanding actions of the United States Air Forces published under the title **The Wild Blue** (*edited by John F. Loosbrock & Richard M. Skinner. G. P. Putnam's Sons, 210 Madison Avenue, New York City. $5.95*): this 600-page volume is an anthology of "the very best that has appeared in *Air Force Magazine*" and its accounts have a vivid, first-hand flavour. Arch Whitehouse's book, though rather dogmatic, gives a fair showing to the rival air forces on the Western Front, where the author served in the RFC as a pilot. Another publication on the same theme, though much sligh-

The Pen and the Air...

ter, is Patrick Pringle's **Fighting Pilots** (*Evans Bros Ltd, Montague House, Russell Square, London WC1. Illustrated, 15s*). Mr Pringle tells stories of bomber and fighter pilots in both world wars.

In the inter-war years many pioneer flights were made which helped to establish today's international air transport network. One of the pioneers for Air France was Antoine de Saint-Exupéry, a strange man with an almost metaphysical approach to aviation, a writer-pilot who has himself been much written about. Marcel Migeo's **Saint-Exupéry** (*Macdonald & Co Ltd. Illustrated, 30s*) is the latest biography, a first-hand assessment by a fellow-pilot. Another pilot who is also a writer is the American Ernest K. Gann, who in **Fate is the Hunter** (*Hodder & Stoughton Ltd, Warwick Square, London EC4*), describes with sensitiveness and a novelist's eye for detail his experiences as a transport pilot. One of the hazards both he and Saint-Exupéry have experienced is storms, and in **The Lightning Book** (*Doubleday & Co Inc, Garden City, New York. Illustrated, $4.50*) Peter Viemeister surveys this particular hazard in historic and technical detail One of the most valuable means of rescue when storms occur at sea is the helicopter, and Patrick Howarth considers this particular rotating-wing application in the course of his **How Men Are Rescued from the Sea** (*Routledge & Kegan Paul Ltd, 68-74 Carter Lane, London EC4. Illustrated, 10s 6d*), which has a chapter on the air-sea rescue services.

None of these aeronautical achievements and adventures would be possible without the back-room boys. Two examples of specialized research have been published recently. One is the record of a symposium held in Amsterdam in 1959, on **Full-scale Fatigue Testing of Aircraft Structures** (*edited by F. J. Plantema and J. Schijve. Pergamon Press. Illustrated, £5*); the other, by a systems engineer of United Aircraft Corporation, W. Richard Kolk, deals with **Modern Flight Dynamics** (*Prentice-Hall International Inc, 34-36 Beech St, London EC1. Illustrated, 50s*).

In their fifty years' existence, aircraft have edged into every corner of our lives. They appear frequently and harmlessly on postage stamps as James Watson's **Stamps and Aircraft** (*Faber & Faber, 24 Russell Square, London WC1. Illustrated, 15s*) and **Fifty Years of British Air Mails 1911-1960,** compiled by N. C. Baldwin (*Francis J. Field Ltd, Sutton Coldfield, Warwicks. Illustrated, 10s*) pictorially attest; they have delivered weapons of mass destruction, whose origin is described by Ronald W. Clark in **The Birth of the Bomb** (*Phoenix House Ltd, 10-13 Bedford St, Strand, London WC2. 16s*); they go into space, as probes and satellites, an exploration discussed by Albert Ducrocq in **The Conquest of Space** (*Putnam & Co Ltd. Illustrated, 30s*); and their construction may generate personal antagonisms, if Rodney Quest's novel **Secret Establishment** (*Hutchinson & Co Ltd, 178-202 Gt Portland St, London W1. 15s*) is to be believed. So much has been achieved by aviation in its first fifty years that the variety and progress of the next half-century will be even more fascinating for the pen to record.

THE INDUSTRY

Reinforced-plastics Wind Tunnel

A SMALL low-speed wind tunnel, intended principally for instrument calibration and made from Bakelite polyester resin, reinforced with layers of woven glasscloth and chopped strand mat, is in use at the English Electric Co mechanical engineering laboratory at Whetstone, Leicester. The tunnel (see illustration below) was designed by the company and made at their Rugby works.

One of a number made by the same method for the Whetstone laboratory, it has a 4ft diameter inlet section and an 8in diameter test section. It is driven by a single-stage axial-flow fan providing a maximum mean velocity of 250ft/sec in the test section. Six instrument ports are moulded into the test section to accommodate either of two traverse gears. One gear is designed for calibrating the tunnel, and permits diametral traverses and yaw measurements; the other is for instrument calibration, and permits the instrument to be rotated in yaw, pitch and roll.

The tunnel laminate was made in sections over wooden formers, and into the walls were moulded static pressure taps together with ready-tapped metal insets for manometer connections. The advantages found in using reinforced plastics were, it is stated, extreme lightness, good internal finish and a saving in machining time.

The 8in working section of the instrument-calibration wind tunnel designed by the English Electric Co for their establishment at Leicester

Choosing a Career in Industry

DESCRIBED in a foreword by the Duke of Edinburgh as being of "... great value and interest to young people and their advisers, who usually find it very difficult to get information of this kind," a remarkable new book has lately been published. Entitled *Industry and Careers*, it is designed to provide a comprehensive picture of career opportunities in the full range of Britain's industries, only those in which opportunities are limited being omitted.

Of 872 10in × 6in pages, the book provides an entirely new treatment of the problem of choosing a career. It breaks away from the conventional pattern of career guides by giving a detailed description of each industry; then, against this background—which is essential for a full understanding—it goes on to review the various careers offered. Whilst the main emphasis is on careers leading to high-level appointments, the book also covers trades and crafts.

Industry and Careers has received the support of the Federation of British Industries and the City & Guilds of London Institute and the collaboration of professional institutions, manufacturing and trade associations and leading companies. It was produced under the general editorship of Mr. D. E. Wheatley, deputy director of the City & Guilds, with the guidance of a distinguished advisory committee.

A striking feature is the use of coloured charts which show paths of promotion, systems of organization and the sequence of operations in industrial processes. The "atmosphere" of various industries is conveyed by the use of photographic reproductions.

Published by Iliffe Books Ltd, Dorset House, Stamford Street, London SE1, the work is available from booksellers at 55s, or at 57s 6d by post from the publishers.

IN BRIEF

Ultra Electronics Ltd have received a contract from Rolls-Royce Ltd worth approximately £17,000 for an initial quantity of speed and temperature control amplifiers, type A609, for use on RCo.42 engines.

The firm of Powell & Co, Kapellenstrasse 1, Bad Godesberg, are appointed official agents in West Germany for H. M. Hobson Ltd and their associate company Integral Ltd.

Elliott-Automation Ltd have created a new directorate of overseas operations, with Mr Keith Newlands as director, as part of their policy of expanding export business. The group has ten operating subsidiary companies overseas. Mr Newlands was until recently sales director of Cossor Radar & Electronics Ltd.

British Insulated Callender's Cables Ltd have supplied about 250 miles of cable—PVC-insulated; PVC wire-armoured and PVC-sheathed; paper insulated and lead covered and PILC with wire armouring; mineral-insulated and copper-sheathed—for electric services in the newly completed BEA engineering and maintenance base at London Airport. Cost of the base is £6m; electrical services have cost £800,000.

SPORT AND BUSINESS

OXFORD HIGH-JUMP

Right, among the newcomers at the Royal Aero Club's Business and Touring Aircraft Competition at Kidlington, reported in last week's issue, was the Rollason-built Druine Condor flown by Norman Jones

Mooney Mk 21 entered by "Flight" and flown by G. C. Wilkinson

Tim Vigors, Piper Aztec, and take-off tape come in to land

Below, the 140yd distance declared by Peter Clifford for the Meta-Sokol in the short-take-off test was perhaps over-optimistic. Right, Piaggio P.166 flown by Ray Young of McAlpine Aviation

"Flight" photographs

FOUR CENTRAL EUROPEAN COUNTRIES are co-operating to organize the 1961 European Air Tour of the Fédération Aéronautique Internationale. Beginning on September 6 at Lugano, pilots will fly on to Venice on September 7, to Lesce Bled on September 8, to Graz on September 9 and to Vienna on September 10. Organization of the tour is in the hands of the national Aero Clubs of Austria, Italy, Jugoslavia and Switzerland, and members of all national aero clubs in the FAI are eligible to attend. Numbers will be limited to 80 aircraft and about 200 people.

AN INVITATION to attend the 14th rally of the Reseau de Sport de l'Air, the French equivalent of the Popular Flying Association, is extended to all British ultra-light enthusiasts. This year the meeting is to be held at the airfield of Morlaix Ploujean (Finisterre) on the north coast of Brittany during August 13-15. The PFA's own rally, on September 9-10, will now be held at Fairwood Common, Swansea, and not as previously announced. Details of both meetings are available from the Popular Flying Association at Londonderry House, 19 Park Lane, London W1.

DEVELOPMENT OF A LIGHTWEIGHT AIRBORNE RADAR BEACON for light aircraft has been initiated by the US Federal Aviation Agency. Intended to provide air traffic controllers with altitude information, the beacon is designated Small Lightweight Altitude Transmitting Equipment (SLATE) and will be used in high-density terminal areas. The equipment will consist of an altitude transducer and transponder system capable of automatically reporting aircraft altitude in 500ft increments from 10,000ft to sea level, with a range up to 50 miles. Bids for a contract to develop such equipment have been invited by the FAA.

AN AERO 145 has been purchased for business purposes by Mr Arthur Harrison, president of the Elmdon-based Warwickshire Aero Club. Shortly before taking delivery of the new aircraft on July 26, Mr Harrison gave his Auster 5 to the club as a gift.

QUALIFYING COMPETITIONS for British National Gliding Championships are to be held in future. Writing in the British Gliding Association's magazine *Sailplane and Gliding*, Mrs Ann Welch, clerk of the course at the 1961 championships, states that 75 entries (40 in League 1 and 35 in League 2) would seem to be the optimum in future contests—compared with the 90 aircraft handled at Lasham this year. The qualifying competitions include national gliding weeks, rallies and inter-Service contests in which a minimum of ten entrants compete for at least three contest days.

"LOCAL" FLYING

IN SEARCH OF AERONAUTICAL INN-SIGNS

BY LESLIE HUNT

Appropriate Courage sign at Stanwell, near London Airport

IT is generally accepted that the Romans brought inn-signs to Britain and that the earliest known sign was a bush which denoted a tavern—giving rise to the saying "A good wine needs no bush." In later years the gate-houses and lodges of the nobility offered refreshment to weary travellers and the crests of these lords of the manor were erected, giving us signs which are now popular as *The Red Lion*, *The Rose and Crown*, and so forth. By the 14th century inn-signs were so common that a limit had to be placed on the size of the boards and the length of the brackets protruding across the narrow streets. The signs were a veritable boon to the majority, who could not read and who found their way around by memorizing the position of the signs.

In ancient times members of the armed forces were billeted in pubs, and some old establishments display the regulations of George III under which a publican got 2d a day for each soldier, 1s for an officer, and 2s 6d for an officer with a horse. Little wonder, then, that for centuries Servicemen have retired to inn-keeping. Many of these ex-soldiers and ex-sailors obtained permission to display the heads of their former commanding officers on their signboards, as in the case of the *Marquis of Granby* at Hounslow, hung by an ex-trooper of Horse Guards in honour of his colonel. But where, today, will one find a sign carrying the picture of a named airman? It *almost* happened when a Berkshire inn requested authority to feature Marshal of the RAF Prince Philip, Duke of Edinburgh; but, sad to say, approval was not given. Did Prince Philip know of the request, one wonders? It is said that *The Prince of Wales* is still the most popular inn-sign in the British Isles; and we must not forget that *The Ordinary Fellow* at Chatham shows an enlarged penny of King George V, with his well-remembered self-description underneath.

Though the air marshals and civil aviators have been neglected by the signboard artists and brewers, one must thank Whitbreads, and the Courage & Barclay directors, for perpetuating some of our famous aircraft and air occasions. Thus *The Startled Saint* at St. Leonard's Cross Road, West Malling, shows the saint's obvious horror of the Spitfires beating-up his halo. This inn was a favourite with Guy Gibson, VC, when he did a tour with No 29 Squadron on night-fighters as a "rest" from bomber ops. Also in Kent is commemorated—and rightly—the RAF's greatest achievement in *The Battle of Britain* at Sheers Green, Northfleet, where a beautiful board shows, on one side, the White Tower in the Tower of London surrounded by balloons and aircraft and, on the reverse, a German aircraft being brought down in flames.

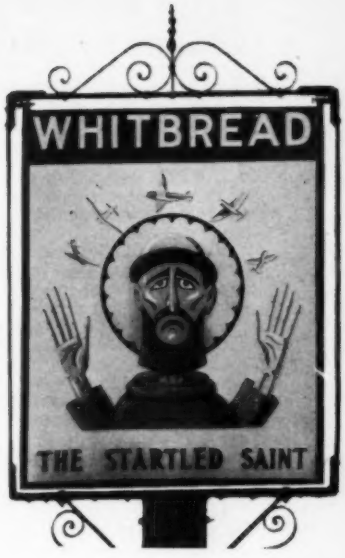
At Folkestone, soon after the war, Hawkinge airfield was honoured when one of the harbour pubs, *The True Briton*, was given a new sign—a helmeted pilot, backed by contrails, to replace the former ship. When I visited the pub in the nineteen-fifties, I was amazed to find the sign changed; and on writing to the brewers I was told that the sign had reverted from its RAF/Ancient Briton theme to its original ship picture in response to "pretty general requests from the purists, coincidental with the issue of a collection of Ships through the Ages." How short can memories be? However, the same brewers still display, at Rochester, Kathleen M. Claxton's bold *Canopus* sign to honour local craftsmen whose industry was responsible for the pioneer flying-boat of our Empire air routes. Both Short Bros and Imperial Airways co-operated when this inn was built and named in 1938: after the last flight the "wheel" was presented to the inn.

Ferry crews landing at Lympne may not be strangers to "the local," but surely *The Welcome Stranger* there can be regarded as the earliest of all passenger-carrying flying-machines! Though Manston rarely hears the whistle and whine of aircraft these days, the Nayland Rock Hotel, at nearby Margate, retains the badges of squadrons which used this field, including Pathfinder badges brought from *The George*, Huntingdon, by the manager, R. B. Johnston (who was made a member of the Pathfinder Club in recognition of his boundless hospitality to airmen from Wyton and other bases).

At *The Swan*, Lavenham, Suffolk, signatures of aircrews are preserved behind glass; and at the *Victoria Hotel*, Holkham, Norfolk, panes of glass in the bar door include the badge of the locally based RAF air/sea rescue unit. Autographs of "The Few" kept at *The White Hart*, Brasted, the pub frequented by "Sailor" Malan and the Biggin Hill boys, still draw ex-fighter types hoping to meet old comrades who may drop in for a nostalgic noggin. Old associations may likewise be renewed at *The Trout Inn*, Godstow, near Oxford, once a home-from-home for thousands who trained at Kidlington, or flew from Bicester, Abingdon, or Culham, and found the peace of the river "just the job" in between operations; some must have spent their last hours in these mellow surroundings, so typical of our land.

The *Aerodrome Hotel* at Croydon and *The Propeller* at Purley are two names that commemorate the Surrey area in which civil aviation made such incredible progress in the inter-war years. Now that the focus has moved into Middlesex we can find on the main road near London Airport the appropriate *Air Hostess* and, on one of the estates of the Airways Housing Trust, *The Happy Landing*, showing the landing wheels of a Britannia about to touch down. (This latter idea was suggested by members of BOAC's display staff and, happily, welcomed by Courage & Barclay Ltd.)

One of Britain's most unusual—and attractive—inn-signs is not a signboard at all, but Eric Kennington's sculptured *Comet* near the de Havilland airfield at Hatfield, to commemorate the 1934 Air Race from Mildenhall to Melbourne, won by the Comet Racer which was later to give us the Mosquito and then the name for the world's leading jet transport. And how appropriate that another de Havilland type should be honoured by *The Tiger Moth*, overlooking Rochester Aerodrome; here the memory of this famous biplane is retained in just the right atmosphere. After a display of aerobatics by Tigers which preceded the opening of this house on April 14, 1959, one of the aircraft (flown by Sqn Ldr F. Holt, with Col R. L. Preston of the RAeC as passenger) was wheeled on to the main Maidstone-Chatham road so that Col Preston could



Four attractive signs on Whitbread houses. "The Welcome Stranger" is not strictly aeronautical, but it is near Lympne Airport. As related in the article, the "True Briton" sign has been supplanted

unveil the inn-sign from the cockpit, as illustrated on this page.

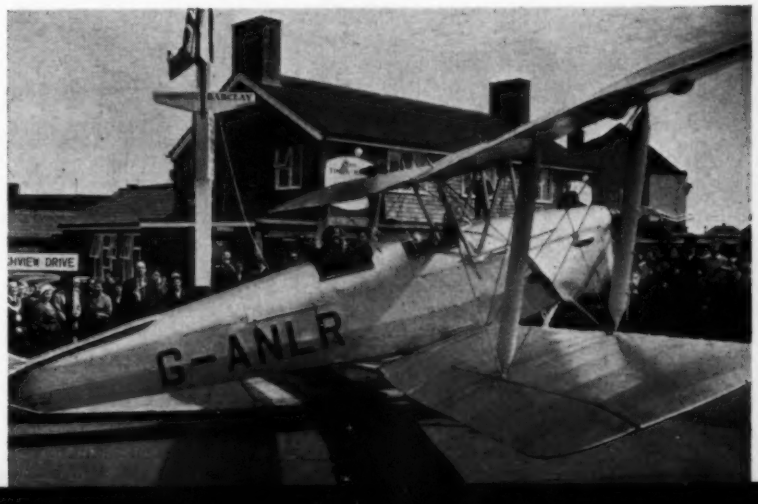
I have not yet had occasion to refuel in the West of England, but I understand that excellent facilities are available at *The Bristol Bulldog* at Filton, and at *The Happy Landings* at Knowle. Perhaps our oldest aviation inn-sign is at *The Air Balloon* at Birdlip, Glos; it is said to be connected with a certain Walter Powell who ascended from Malmesbury and was never seen again. There is also an *Air Balloon* at Bilston, Staffs.

London readers will probably know the lovely sign which distinguishes *The Britannia* in Mare Street, Hackney; but why, oh why, aren't there more inn-boards to honour our aircraft, the designers, pilots and the RAF and Fleet Air Arm, to say nothing of the civil airlines? Whilst not wishing to quarrel with the decision to re-name a Hastings pub *The G.I.*—with appropriate sign—one thinks of Uxbridge; some years ago this Middlesex town was celebrated for having twice as many licensed premises in proportion to population as any place in England. Not one of them honours either aircraft or aircrew, though the majority of the country's "aces" must have passed through what was the RAF's No 1 Reception Centre.

Readers may point out that on my sorties I have overlooked some particularly relevant targets; but I still await the news that (let us say) *The Air Marshal* is to be unveiled, with its sign portraying Lord Trenchard; or *The Few*, with James Brindley Nicolson, VC; or *The Lancaster*, with Avro's great bomber on one side and Guy Gibson on the other. What scope for imaginative brewers—and the artists they commission.

The famous "Comet" at Hatfield

A Tiger Moth opens "The Tiger Moth" at Rochester



Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

The Munich Crash

LEST the problems of the Munich air crash of February 1958 (BEA Elizabethan G-ALZU) become conveniently shelved on the premise that three-and-a-half years is ample time in which to let the matter die a natural death, this Association states its case for the present record.

We contend that the primary cause of this accident was the retarding effect of slush on the runway. We adhere to this opinion and always have supported it. Over the years our opinion has been backed by official pronouncements on the subject; notably the Ministry of Aviation's *Information Circular No 8* of 1961. The circular was a very necessary document, which dealt comprehensively with measures for dealing with the problem of take-off from runways covered with snow, slush or water, and BALPA gave it full support, but at the same time expressed surprise that the research which had gone into establishing the factors used in the circular was not applied to the performance of G-ALZU on a slush-covered runway.

This is something which can and must be done. Until some official and authoritative examination of the cause of the accident is made, in the light of the information made known, largely as a result of BALPA's effort subsequent to the accident, the Association will remain dissatisfied and will continue its efforts to secure a full enquiry on the basis of the now known facts.

To all concerned we re-state our claim that the truth should be officially recognized and that justice should be done.

Hayes, Middx D. FOLLOWS,
General Secretary, the British Air Line Pilots' Association

Archimedes Wasn't There

THE need for more widespread science education was demonstrated on July 21 when the space capsule *Liberty Bell* was abandoned in the sea. An elementary knowledge of the Archimedes Principle would have told the unfortunate helicopter pilot that if his machine was powerful enough to carry *Liberty Bell* back to the *Randolph* it could easily have held it once it had sunk below the surface. He should have paid out cable until the capsule sank, and then hovered there until boats could relieve him. Instead, *Liberty Bell* became *Diving Bell*.

Warrington, Lancs A. GREEN

The Carvair's Ancestry

I WAS much interested to read your fine report on the Carvair prototype (June 29 issue). Its "guppy-type" nose makes the old Skymaster look as though it's suffering from a bad dose of the mumps; nevertheless, it should do a fine job in its new form.

Readers may be interested to know that G-ANYB was originally a C-54B, "civilianized" in 1946 (originally built in 1944 at Douglas Chicago Plant). It became N59952 in 1946 and was acquired by Air Charter Ltd early in 1955, becoming G-ANYB on the UK Register. If the men who flew it in those USAAF days could see it in its present guise, it would certainly give them something to talk about!

Nairobi, East Africa DENNIS POWELL

Terminal Unintelligibility

IN the extremely unlikely event of my ever having to write the Fourth Leader of *The Times* I would place high on my list of possible subjects Announcements Broadcast at Air Terminals. The other day, during a 35min enforced wait in idleness, I heard an initially dulcet female voice change by repetition into first a meaningless drone and then a nerve-rasping dissonance as for 18 times there came from the voice-box: "May I have your attention, please . . ."

Such faceless repetition dulls rather than raises attention. But the truly awful thing is that even as an Englishman only rarely could I grasp what the message was except in a generalized way. The climax for me today was reached when, after the MIHYAP gambit, there followed *in English* a request for a Portuguese passenger who had just arrived to report at once to the Enquiry Desk. If the Excmo. Senhor spoke no English, then he would have been in exactly the same case as if he had, for the announcement was so blurred and slurred that I was forced to ask at the desk exactly what it had been.

It seems to me that what Lonsdale Hands did for design (it was wickedly said once that he spent a whole week designing the word GENTLEMEN for the toilets) should be effected by some unknown expert of the spoken word for air-terminal announcements. Already the sheep are badly enough shepherded; what is wanted is the real come-hither voice plus a discretionary employment of a variety of routine phrases . . . where obviously necessary in a foreign language, learned parrot-fashion as the opera people do.

London SW7 B. J. HURREN

Aviation "History"

WHERE on earth *do* the TV people get their aviation facts from? In a programme on July 26 called *Thirty Years After* only about five minutes were devoted to aviation, but in even that short time they dropped two clangers. First they said the 1931 Schneider Trophy Contest was won by Flt Lt George Stainforth. Anyone in aviation could have told them John Boothman won it.

Then they said that in 1931 Wiley Post and Harold Gatty made the first flight round the world. It shouldn't have been difficult, if the TV people cared to take the trouble, to have found out that in 1924 Lts Lowell Smith and Harold Gatty flew round the world in 175 days in two Douglas World Cruisers of the US Army Air Force.

Imagine what they might have done if the whole hour had been devoted to aviation!

London W14 GEOFFREY DORMAN

"Sammy" Allard

MAY I appeal through your columns for information on the late Flt Lt Geoffrey Allard, DFC, DFM and BAR. I am at present engaged in research on distinguished ex-Halton aircraft apprentices for a series of factual biographies being printed in the *Halton Magazine*—the house magazine of No. 1 School of Technical Training.

Whilst I have already gathered a fair amount of information on Flt Lt Allard's career, I am particularly lacking information on the period October 23, 1937 (when he graduated from pilot training as a sergeant) to August 17, 1940, when he was posted to No. 85 Sqn on commissioning. There are quite a few odd references to his air encounters during the Battle of France, but none give a specific reference to the squadron(s) he fought with in that campaign, for example.

If any of your readers can assist my researches, I would be most grateful for *any* information they may wish to pass on. The object of the series of articles is to show the present-day aircraft apprentice some of the men who helped to forge the "Halton tradition" and, it is hoped, to imbue them with something of the spirit of such gallant men as "Sammy" Allard, Frank Carey, Sgt. Gray, VC, Roy Ralston and thousands of other ex-"Trenchard brats."

Gainsborough, Lincs. R. BOWYER

[The writer—to whom replies should be addressed direct—is Snr Tech R. Bowyer, Sergeants' Mess, RAF Kirton-in-Lindsey, Gainsborough, Lincs—Ed.]

CORRESPONDENCE IN BRIEF

Mr G. L. Williams writes to point out that in his letter "The Most Economic Jet" (July 20) an error in transcription caused the economy advantage of the Spey over the Comet 4 Avon to be quoted as 1 per cent instead of about 17 per cent. He asks us to check the exact value, and Rolls-Royce have kindly provided the following comparative figures for the Comet 4 Avon 524B and Trident Spey Mk 1, under identical conditions of 425kt t.a.s. at 30,000ft ISA: Avon, 2,930lb at 7,250 r.p.m. with specific consumption of 0.922; Spey, 3,230lb at 11,860 r.p.m. with specific consumption of 0.754. On this basis the Spey specific consumption is just under 82 per cent of that of the earlier engine; but its greater thrust means more fuel per hour—about 90 per cent of Avon consumption on a time basis; and the greater thrust should raise Comet cruising speed, so that the fuel consumed per mile may be even less than 82 per cent. Precise comparison is difficult, but the advantage is clearly of the order of 15 to 20 per cent.

FORTHCOMING EVENTS

Aug	1-13	Italian Gliding Championships.
Aug	12	Doncaster and District Gliding Club: Open Day.
Aug	19	Lancashire Aero Club: Open Day, Barton
Aug	27	Forli Rally.
Aug–Sept	27–3	Swedish Parachute Club: International Contest, Uppsala.
Aug–Sept	29–2	International Light-aircraft Exhibition, Luton Airport.
Sept	3	Wolverhampton Aero Club: At Home.
Sept	3-14	8th Anglo-American Aeronautical Conference (joint IAS/RAeS/CAI), London.
Sept	**4-10**	**SBAC Exhibition and Flying Diplay, Farnborough.**
Sept	6-10	FAI: European Air Tour
Sept	8-10	Popular Flying Association: Rally, Cranfield.
Sept	9	British Air Mail Society: Golden Jubilee Exhibition and Dinner, Windsor.
Sept	11-15	Royal College of Advanced Technology, Salford: Course on Noise Measurement.
Sept	11-17	Battle of Britain Week.
Sept	13-17	German Aero Club: 2nd International Sporting Pilots' Rally, Baden-Baden.
Sept	23-24	International Grand Prix for Light Aircraft, Bourges.
Oct	7-8	Genoa Rally.
Oct	12	Guild of Air Pilots and Air Navigators: Lecture by Air Cdre W. K. Stewart.

Straight and Level

THIS is Bacon's flying-boat week. Everybody knows (I hope) that the forerunner of the flying-boat as we know it today was Glenn Curtiss's "hydro-aeroplane," which I depict in an illustration (bottom left) from *Flight* of September 2, 1911. A truly historic aircraft; but consider (bottom right) what was being dished up for the younger generation in the same year by the boys' writer Herbert Strang—a monoplane with a true flying-boat hull (as distinct from a central float) and having sponsons for lateral stability, a tractor airscrew and a water propeller, as on the fabulous Piaggio Schneider aspirant that I illustrated some weeks ago. And note the title—at a time when the grown-ups were still being weaned on "hydro-aeroplanes" and "waterplanes." The term "flying-boat," I find, did not come into general use until 1913 at the earliest.

● Three times now Parliament has discussed those bottles of whisky at London Airport. Hon members have been quite witty and scathing about these monuments to bad taste. But I am still waiting for Parliament to take an interest in the BOAC and BEA annual reports for 1959-60, which have never been debated, and in the 1958-59 reports, which were hardly debated. Perhaps MPs will find the corporations' 1960-61 reports as stimulating as they seem to find those whisky bottles.

I make the point because, when the Press asks the corporations for a preview of their annual reports, so that we can review them properly on the day of publication, we come up against (capital letters) Parliamentary Privilege. At the news conferences on the day of publication we are expected to ask intelligent questions about 100-page reports which we have had in our possession for five minutes. Until Parliament takes an interest in these reports I shall respectfully say "humbug" to Parliamentary Privilege which deprives the Press of a preview.

● I learn from the Admiralty that the WRNS now have a Jenny Wrenn, in the person of Wren Jennifer Rosemary Wrenn. Jenny joins WRNS personnel who include one Swan, two Nightingales and a Starling, two Finches, three Swallows, one Partridge, one Peacock, one Rook and a Raven. She could find herself serving in HMS *Sea Hawk*, HMS *Falcon* or HMS *Heron*.

● At Gatwick the other day I made a small personal observation of the Ministry's non-commercial approach to running an airport. It was a lovely day and aeroplanes of all sorts were coming and going—a sight which, as at other airports in the world, people would gladly pay a bob or two to watch. But the top deck of Gatwick's long pier was deserted; *though planned for spectators*, it is barred to the public.

The thought of all the lovely lolly that the Ministry could earn by opening this promenade to spectators made me want to burst into tears. I gather that it is as much as the airport commandant can do at summer weekends to control the passengers, let alone the spectators.

No doubt the revenues would be minute compared with the £1.07 million that Gatwick lost in the last year for which accounts are available. But what an attitude! GO AWAY, WE DON'T WANT YOU.

At New York you put a dime in a turnstile and can spend as long as you like on the top decks of the piers. For a further dime you can listen to R/T conversations, and so on. When present plans to build two new fingers at Gatwick are implemented there will, I am told, be provision for spectators. Meanwhile, with a little organization, they could be allowed on to the existing pier.

● Not everybody knows, because it has been little publicized, of the aerobatic ability of the Boeing 707. Tex Johnson has rolled the 707 on a number of occasions, as indeed he has rolled a B-52. (OK so long as you keep the speed up, he explained to a *Flight* colleague, but let it fall off and it's a son of a lady dog.)

This set me wondering which was the first aerobatic airliner. I think I may have found the answer in the latest of the superb Harborough books, *Fokker —the Man and the Aircraft*. It seems that the three-engined Fokker ordered by the Air Ministry for testing in the 1920s was delivered to Martlesham Heath. The pilot beat up the aerodrome on arrival and then proceeded to execute three loops. A little matter that had been overlooked, however, was the presence of an Armstrong Siddeley mechanic (the aircraft had Lynx engines) in the back of the cabin. "He looked somewhat green," writes Mr Henri Hegener, the author of the book, "but fortunately the three successive loopings had been executed so perfectly that he had not fallen from the top of each loop on to the ceiling and then back again into his chair. . . ."

● From an MoA Notam:
TEMPORARY NAVIGATIONAL WARNING
Nature of Hazard: International Business and Touring Aircraft Competition.

ROGER BACON

Left, the Glenn Curtiss hydro-aeroplane, 1911, and right—I'm not quite sure that it is, but I think that I have discovered one of the first uses of the term "flying-boat." *See first item in col 1 above*

A good idea of the general arrangement of the two-seated hydro-aeroplane built for the U.S. Navy by Glenn H. Curtiss.

AIR COMMERCE

Seen in flight together are the two Convair 990s now on FAA certification flight tests. Deliveries will begin before certification, which is due in December

ATLB PUBLIC MEETING 21 (Continued)

HERE is our seventh report on the Air Transport Licensing Board hearings in the big European route case that began on June 20. So much of interest has been spoken by applicants and objectors that it has been difficult to decide what to leave out of our summaries; we have therefore continued to sacrifice some topicality in order to keep the record reasonably complete. The international hearings finished on July 28; the domestic hearings lasted three days and finished on August 2.

POPULATION of South-East England, continued Mr Franklin of Silver City (stating his case for a service from Lydd or Manston to Basle), was about 1m (excluding London) and growing rapidly, and should not have to travel, in the wrong direction, to London Airport or to Gatwick in order to go to the Continent. Silver City Airways believed that their special fares and this growing population provided justification for the service for which they wanted a licence.

Asked by Mr Marking of BEA whether he was confident about the future of IT charters, he said that he was guided by the tour operators, who seemed to be confident: he did not agree with those who said that it was a dying business.

Next application was Cunard Eagle's A.1062, for a service between London and Geneva. Mr Ashton Hill introduced Cunard Eagle's document for the route, showing an estimated traffic growth of 104,000 between 1960-61 and 1965-66, compared with Cunard Eagle's estimate for their own traffic in 1965-66 of 11,000—10 per cent of the growth figure. The services of the eight existing carriers on the route were listed and Mr Ashton Hill commented on the use of DC-6s by Swissair in the summer in competition with BEA's Comets.

Mr Collingwood, once again the witness for BEA's objection, was questioned by Mr Marking about particular aspects of the bilateral agreement affecting this route. He said that British and Commonwealth states other than the United Kingdom were not covered by it: they had their own bilateral agreements with Switzerland. On the designation of one operator for one route, he quoted the clause of the agreement saying that "an airline will be designated in respect of each service." The 1959 revision of the agreement contained a detailed schedule of the routes and designated airlines; this bore out the principle of one operator for one route. Fifth and sixth freedom operators had carried four per cent of the total traffic in the previous year.

Next came Tradair's application A.1271, for a service from Southend to Klagenfurt between May 1 and October 15 each year. Mr Porter said that Tradair hoped to run a pilot scheme in the summer of 1962, and planned to run five services weekly, all daytime flights, by the summer of 1963. The IT fare of £29 13s would be applied.

Next came Cunard Eagle's application A.1063, for a service to Copenhagen and/or Stockholm.

Mr Ashton Hill introduced Cunard Eagle's supporting document and gave details of the service at present operated by the four carriers on the route, including Japan Air Lines and Pan American to Copenhagen. He estimated a traffic growth of 108,000 to Copenhagen and 33,000 to Stockholm between 1960-61 and 1965-66. Of this, Cunard Eagle hoped to carry 15,000 to Copenhagen and 5,000 to Stockholm by 1965-66—14 per cent and 15 per cent of the growth respectively.

Cunard Eagle in Scandinavia

Cunard Eagle had offices in Stockholm and were already designated as carriers ex Manchester to Copenhagen in the Anglo-Danish bilateral agreement. The Swedish bilateral agreement was more liberal in its terms.

Mr Collingwood, for BEA, gave his usual evidence about the implications of the bilateral agreements, and suggested that BEA were already taking up the full British share of the traffic on the London - Copenhagen and London - Stockholm routes. He said that SAS had suffered very serious financial reverses and had undergone drastic reorganization, so that it was difficult to forecast what their attitude might be, but it was unlikely that they would welcome another operator on these routes.

Application A.1029, by BUA for a service from Gatwick to Tarbes on Tuesdays, Wednesdays and Thursdays, between March and October, was opposed by BOAC and EAFS only. There was no cross-examination by the objectors.

Application A.1027, also by BUA, was for a service from Gatwick to Nice, and was opposed by EAFS, Skyways, BEA and BOAC. Mr Whybrow confirmed that BUA had carried 2,071 passengers on inclusive tour flights to Nice in 1960. They were asking for a round trip capacity of 22,400 seats per annum and estimated that their carryings would represent 6.9 per cent of the 1960 air traffic at a load factor of 35 per cent and 11.9 per cent at 60 per cent.

Giving evidence for BEA's objection, Mr Collingwood confirmed that Nice came within the ambit of the Anglo-French bilateral agreement in the same way as the London - Paris route. Air France had not operated to Nice for some years but were now operating and were returning to parity with BEA. BEA carried 57 per cent of the traffic, Air France 34 per cent and other operators the remaining 9 per cent.

Mr Collingwood was cross-examined by Mr Gardiner who, having asked whether there were any fifth or sixth freedom operators, suggested that the route was a straight BEA/Air France monopoly.

Mrs Whittaker presented the case for Skyways' objection to BUA's application, producing facts to demonstrate Skyways' interest in the area, and suggesting that Skyways had a prior claim to the right to serve it. Counsel for BUA cross-examined Mrs Whittaker on Skyways' discontinued Coach-air service to Nice and their ordinary scheduled services to other points in France. Mrs Whittaker said that the Nice service had been by air to Lyons, with a coach connection to Nice. Their other services were to Lyons, Vichy, Montpellier and Tours.

Applications for Nice

The next application was A.1058 by Cunard Eagle Airways, for a service from London to Nice and/or Palermo and/or Malta.

Introducing the Cunard Eagle supporting document, Mr Ashton Hill said that CEA were making applications for two services to Nice, the one under consideration and another from Manchester. The document covered both. He estimated that the traffic to Nice would increase by 113,000 between 1960-61 and 1965-66 and that CEA would carry 8,000 passengers London - Nice in 1965-66, operating nine flights weekly in the summer and three in the winter. There had been 72,000 passengers to Malta in 1960. Malta had ambitious plans for the development of its tourist industry and CEA suggested that there should be 180,000 passengers by 1965-66 of whom they hoped to carry 13,000.

CEA had also applied for the Malta route and had received a licence from the Government of Malta dated June 5, 1959; this showed that Malta was willing to allow them to operate to the island.

Giving evidence for BEA's objection, Mr Collingwood said that Palermo was not covered by the Anglo-Italian bilateral agreement; BEA were operating on a temporary permit.

Mr Marking asked Mr Collingwood to quote the present schedules to Malta and the fares, also load factors for April/June 1960 and 1961 (73 per cent and 67 per cent). Mr Collingwood said that a high load factor was essential to the maintenance of low fares; the introduction of an additional carrier would probably reduce the load factor and might make it necessary to raise fares. The Board asked the break-even load factor for the fares in force; witness suggested it would be in the 70s.

The Board proceeded with the hearing of application No A.1003, by BUA, for a daily service between Gatwick and Genoa. After Mr Gardiner had produced the usual BUA supporting document, emphasizing in his introductory remarks that there had been 1.5m British visitors to Italy in 1960 and only 54,000 Italian visitors to Britain, Mr Whybrow was called as the BUA witness.

He confirmed the statistics and estimates in the document and said that, as this was a new route, the traffic would also be new, augmented by some which had in the past been carried by surface transport. BUA might be able to start in 1962 if the Genoa airport were completed in time, but this was unlikely.

Mr Marking of BEA began his cross-examination by referring to BUA's objection to BEA's application for this route and suggested that BUA's attitude to competition was different in this case. Mr Whybrow said that BUA, if licensed on the route, would want some degree of protection initially, but would accept competition from a second British carrier—provided their own frequency was not restricted—when traffic had reached 50-70,000 passengers per annum. Asked about the implications of the bilateral agreement, Mr Whybrow thought that the Italians

might be less restrictive on the Genoa than on the Venice route because of the larger tourist area served by Genoa.

Mr E. C. Mekie, of Silver City, next cross-examined Mr Whybrow and asked if he was aware of the reason why the service which Silver City formerly operated to Genoa had been suspended. Mr Whybrow suggested that it was because they had no more flying boats left. Mr Mekie then asked whether Silver City, having once operated a service to Genoa and being willing to resume operations, were not entitled to protection and priority of consideration for the route. Mr Whybrow said that Silver City operations had been so long ago that they were historical.

The Board next heard the application by BEA for the same route. This, A.1907, was opposed by Silver City, BUA and Skyways. Mr Milward, witness for BEA, said that the application had been submitted on February 14. He briefly reviewed the terms of the application and said that BEA expected the airport at Genoa to open in the spring of 1962, when they proposed to begin operations with Comet 4Bs. These would operate at a restricted load, if necessary, until the full length of the runway was available.

A service by any other operator, said Mr Milward, would divert traffic from the existing services of BEA, whereas BEA could fit the Genoa route into their existing pattern. A BEA service would divert traffic only from the Pisa service of Cunard Eagle, and the diversion would be so small that CEA were not objecting to BEA's application. He estimated that 80 per cent of the potential Genoa traffic was already being carried by existing BEA services to other points. BEA's pool agreement with Alitalia would cover this route.

Asked by Mr Marking why he thought a licence should be granted to BEA, Mr Milward said that BEA would offer the best service, at an adequate frequency, with faster aircraft. They had a first class sales organization to meet competition from Alitalia. Operation by BEA of this route would also help the continued development of their relations with the Italian airline.

Counsel for BUA cross-examined Mr Milward. After commenting that the Board had had plenty of opportunity to judge how BEA, with 140 routes, handled the operation of a service, but not the same chance to judge the independents, Mr Gardiner said that BUA had made their application for this service in December, 1960; was it not correct that BEA had objected to this application in January, 1961, and themselves submitted an application in February 1961? Mr Milward accepted the dates as correct. Mr Gardiner then asked wheher Mr Milward could reconcile the statement made by BEA in their objection that there was no potential need or demand for the service, with the claim, made in their own application, that the traffic would exceed that to Milan or Nice. Mr Milward agreed that the two did not seem to clew up.

Mr Gardiner said that BEA claimed in their objection that there would be wasteful duplication of their services by BUA. What services? Mr Milward said that a BUA service to Genoa would duplicate the BEA services to Nice and Milan. Asked whether BEA's own service to Genoa—if granted—would not produce the same duplication, Mr Milward said that BEA preferred to do their own duplicating; they would then be carrying the traffic on one route or the other. He did not agree that the bargaining position of an independent would be better than that of BEA in making a commercial agreement with Alitalia for the new route.

Mr Mekie cross-examined Mr Milward in support of Silver City's objection. He asked whether it was not fair to say that BEA claimed that where they had a licence and had spent money pioneering a route they alone should be allowed to reap where they had sown. Mr Milward agreed. Mr Mekie then asked whether this did not apply also to other airlines. Mr Milward said that the Silver City flying boat service had been a very minor operation of a different kind and had ended three years ago.

BEA "Clews Up" a Point

After a brief cross-examination by Mrs Whittaker, for Skyways, Mr Milward was re-examined by Mr Marking with reference to failure of BEA's own application and their objection to BUA to "clew up." He said that a BUA service would divert traffic from BEA; there was therefore no justification for granting a licence to BUA. He also thought there was little likelihood of securing more than 50 per cent of the traffic on the Genoa route for a British carrier except through a commercial agreement with Alitalia.

Mr Gardiner pointed out some apparent inaccuracies in the BEA tables and suggested that their table for the London - Genoa route was "balderdash." He referred to the figure for BUA expected traffic as a percentage of BEA accumulated growth in the period 1962-63 to 1965-66—476 per cent—and asked for a figure for the BEA expected traffic as a percentage of BUA accumulated growth. The Board also asked Mr Gilbert of BEA to clarify certain apparent inconsistencies.

Business continued with the hearing of Tradair's application A.1273 for a service to Genoa, during the summer season only (May to October). Objections to this application had been made by BEA, Silver City Airways and Skyways. Mr Porter's presentation of the Tradair application was brief; he said that the application stood as submitted with the restrictions on bookings he had already mentioned. The Tradair capacity would be 7,200 seats per annum and, as this would be a new route, they estimated a 60 per cent load factor only, i.e., 4,320 passengers per annum.

Mr Marking's cross-examination was equally brief; neither the other objectors nor the Board had any questions to ask and Mr Porter made way for the next applicant. This was Mr Mekie, advocate and witness for Silver City application A.1144, for a licence for a service from Manston, Bournemouth or London to Marseilles and Genoa. Mr Mekie said that the Silver City application was different from the others in that Silver City had a licence and experience of operating a service to Genoa; they were appearing before the Board to protect that which they had. He would suggest that BEA and BUA had taken on the mantle of Ahab and were seeking to rob Naboth's vineyard.

As soon as Silver City heard of the intention to build a land airport at Genoa they had lodged an application for a licence in order to reap where they had sown. The application stated that they would use Viscounts at a later date, but Silver City understood that the airport would not be ready for use in 1962. Since their application had been lodged they had been granted other licences for which they would require long range aircraft. Silver City were waiting for the result of their present application before acquiring aircraft for the route as they did not want to come before the Board claiming that they had bought aircraft for the service and were therefore entitled to a licence. They wanted to know what their commitments were, and then order the aircraft they needed.

Having started the service and being the only holders of a licence for a route in which they had invested capital, Silver City felt that they, and they alone should be granted a licence now.

With regard to the other applicants and objectors, BEA were applying one code to themselves and a different code to others; BUA wanted a licence because they felt that they would like to go there; BOAC's objection didn't count; and the objection made by Skyways was vague and did not require consideration.

Mr Mekie's Bread

Mr Marking, cross-examining Mr Mekie, suggested that BEA were not seeking to reap where others had sown, as Silver City had sown on the waters of the sea. Mr Mekie replied that he had excellent scriptural authority for casting his bread upon the waters; the Chairman commented that theological debate with Mr Mekie would lead the BEA advocate into deep waters. Mr Marking suggested that Mr Mekie's bread was under the waters.

Mr Gardiner, cross-examining, went on to suggest that a £17m company like BUA might do better in competition with Alitalia than Silver City with four-engined Handley Pages, which he described as old-fashioned tricycles. Mr Mekie said that they were proposing to use Viscounts, which Silver City would have no trouble in getting.

The next application to be heard was A.1281, by BEA, for a service from London to Marseilles. Objections had been entered by Silver City and by Overseas Aviation. Mr Milward, witness for BEA, confirmed the terms of the application and said that BEA would like to start operations on the route with effect from November this year. BEA had operated the route in 1946 but had withdrawn when Nice was developed because services to both points were not then justified. They had watched developments and thought that a separate service to Marseilles was now justified.

Mr Milward gave BEA's estimates of traffic potential. He said that 90 per cent of the initial traffic to Marseilles would otherwise have been carried on BEA services to other points, or via Paris. BEA could therefore develop the London - Marseilles service without wasteful duplication, but any other carrier would divert traffic from BEA.

The Board next turned its attention to applications for services to Madeira, dealing first with A.1022, by BUA, for the route Gatwick - Lisbon - Madeira (Porto Santo). The history of this route, presented by Mr Gardiner for BUA, covered the earlier operation of a flying boat service by Aquila Airways, abandoned because of difficulties caused by weather delays, and the application made by Airwork and Hunting-Clan in 1959 for a service to the airport being constructed on the adjoining island of Porto Santo. This application had been refused on the grounds that there was no reasonable means of transport for passengers between the island of Porto Santo and Funchal. Madeira had been considerably developed by the Union Castle Line, and BUA, in association with Union Castle, had offered to provide a suitable vessel, at a cost of £150,000, for the sea link between Porto Santo and Funchal. BUA were also considering building hotels in both Porto Santo and Funchal.

Mr Mekie of Silver City cross-examined Mr Whybrow and asked who had defined the BUA sphere of influence in which they included

Disembarking at London Gatwick on July 31 are passengers who accompanied Overseas Aviation's inaugural service from Prestwick via Manchester. A note on the new service and on Overseas appears on page 202

After a lifetime in commercial air transport, Mr Wilfred E. Clark has retired as the specialist consultant, notably on the VC10, to Vickers' civil aircraft development group. Mr Clark joined Aircraft Transport and Travel in 1919 and served subsequently with Instone Air Lines, Imperial Airways, BOAC, and Airwork

AIR COMMERCE . . .

Madeira and asked if Mr Whybrow knew whose flag flew over the island. When Mr Whybrow suggested the Portuguese flag Mr Mekie asked if the witness would accept his word that it was the Spanish flag; Mr Whybrow said that he would, and Mr Mekie said that he would be wrong!

On traffic estimates, Mr Mekie suggested that BUA's were too low and pointed out that Aquila had carried 5,700 passengers in 1957 and 10,500 in the eight months during which they had operated their service in 1958. Mr Whybrow said that the route would have to be re-opened and developed and Mr Mekie suggested that it would be easier for the company with the history of previous passengers to do this. Mr Mekie also asked for details of the vessel which BUA were proposing to provide for the Porto Santo - Funchal service; another BUA witness said that the £150,000 which BUA were prepared to invest would buy a 160-ton vessel 110-130ft long, capable of carrying about 100 passengers at a speed of 17-18kt.

The next Madeira application heard was BEA's A.1098, for a service via Lisbon to Porto Santo or Funchal. Mr Milward said that BEA intended operating a year-round service at an initial frequency of one flight per day with Comet 4Bs. It would be an extension of the London - Lisbon service being operated entirely by BEA for themselves and on behalf of TAP. In order to provide a link between Porto Santo and Funchal BEA proposed to make use of a small runway at Santa Caterina, near Funchal. TAP were proposing to operate the link with Viscounts after starting with small aircraft [Ju 52s]. Mr Milward suggested that the service to Madeira could be efficiently operated only via Lisbon, integrated with the Lisbon service. BEA's good relations with TAP would probably enable them to get rights to carry cabotage traffic between Lisbon and Madeira.

Mr Gardiner cross-examined for BUA. With regard to the pooling agreement with TAP, and BEA's assumption that they would get only half the revenue from the route, he suggested that it was time some other operator had the chance of seeing if more favourable terms could not be obtained for British carriers.

Mr Mekie of Silver City was the next to cross-examine Mr Milward. He suggested that Aquila had shown the quintessence of brilliance in making an agreement with TAP which not only gave Aquila all the traffic and the revenue from it but also secured for them a subsidy for operating the route. Mr Milward agreed that if Aquila had done that it had indeed been the quintessence of brilliance.

Silver City's Madeira Cake

Presenting his case for Silver City's Madeira application (A.1084), Mr Mekie said they regarded it as in substitution for their existing flying boat licence for a service from Southampton to Lisbon and Funchal. BEA and BUA were both attempting to buy up the rights of the old timer on the route by arguing the benefit which their expenditure on aircraft would bring to British civil aviation: neither had made any attempt to take up the Madeira service at the time Aquila (Silver City) had suspended operations.

Aquila had withdrawn their service regretfully, but they had hoped that the suspension of the service would force the Portuguese Government to build a landplane strip. Aquila had persisted with the service despite the losses they suffered through interruption of their operations by heavy swells, but the difficulties had forced Aquila to suspend the service in September 1958.

By their operation of the service to Madeira Aquila had earned for British civil aviation the respect and affection of the islanders. As proof of this Mr Mekie read a letter which had been written to him by Mr John Blandy (the Union Castle agent in Madeira) and a translation of an article which had appeared in the local paper; Mr Mekie suggested that an airline which received such tributes was a worthy representative of British civil aviation and should be granted a licence to operate to Madeira rather than BEA or BUA, who had so far done nothing for the island.

Mr Mekie thought the "ancient" TAP Ju52 aircraft which BEA proposed to provide the link between Porto Santo and Funchal were unsuitable.

Silver City were proposing to use D.H. Caribou aircraft which would operate from the aerodrome at Funchal and from the roadway of a wide avenue in Porto Santo; this avenue could be cleared for the short time needed for landing and take-off.

Mr Mekie was cross-examined by Mr Marking about the operation of the Caribou. Mr Mekie said that the unrestricted length of the avenue was 400yd, ample for this type of aircraft; it was also wide enough and had adequate bearing strength.

After further questions about the equipment which Silver City proposed to use and suggestions that the use by BEA of the most modern aircraft available (Comets) would do more to further the development of British civil aviation, Mr Marking asked what advantages Silver City could offer to offset out-of-date equipment and low frequency. Mr Mekie suggested knowledge and experience of an island, which the BEA chief executive had not found it necessary to visit, and extensive goodwill resulting from Aquila's past operations.

The Board next heard Tradair's application A.1269 for a service from Southend to Teneriffe. Mr Porter confirmed the terms of this application which was, he said, the fourth of a series to cater exclusively for traffic at inclusive tour and excursion tariffs. Mr Porter suggested that Tradair's proposed services could be kept outside the terms of the Spanish bilateral agreement and said he agreed with Mr Gardiner's suggestion that the independent companies should do their own negotiating. Tradair had succeeded in getting permission to extend their Seville service to Casablanca after government negotiations had proved unsuccessful.

Mr Porter referred to his earlier statement that Tradair were not putting forward purchasing commitments in support of their applications but could acquire three more Viscounts immediately if their applications were successful; he said that Tradair had, in fact, already decided to buy.

Next to be heard was the application by Overseas Aviation, A.1141, for a service from Gatwick to Porto Santo. Mr Pink produced no statistics but quoted the Portuguese National Tourist Office as saying that 70 per cent of the tourists visiting Madeira during the year ended on November 30, 1960, were British and that there was a definite need for a direct air link.

Mr Marking of BEA, cross examining, asked Mr Pink to confirm that the application was made by Overseas Aviation (C.I.) Ltd, a company registered in the Channel Islands including among its directors Mr Myhill and Mr Dromgoole who between them held a controlling interest. Mr Pink agreed. Mr Marking asked whether Overseas Aviation (Engineering) Ltd was similarly constituted and controlled; of this Mr Pink was not sure. Mr Pink confirmed that Messrs Myhill and Dromgoole had a controlling interest in Overseas Aviation Ltd. Mr Marking asked whether the capital of Overseas Aviation Ltd was £20,000, of which Mr Myhill held 95 per cent and his wife 5 per cent. Mr Pink was not sure of this.

Overseas Aviation's Resources

Could Overseas Aviation (C.I.) afford to run the proposed service—had they the necessary equipment and aircraft? Mr Pink said they they could—they had 20 Argonauts. Mr Marking asked whether the Argonauts were paid for and whether the company had any unpaid debts. When Mr Pink said that he did not know Mr Marking suggested that a company owing BEA substantial sums of money should not come before the Board with this application. [At a later hearing, to be summarized in due course, Mr Myhill challenged the validity of this question.]

Mr Gardiner, cross-examining for BUA, said that Mr Pink had said, in connection with a previous application, that his company lacked the resources to produce facts and figures—had they the resources for the operation of this service? Mr Pink said that they had.

The Board then considered applications for services to Dublin, the first of these being A.1018 by BUA, for a service from Gatwick. The usual BUA supporting document was submitted and Mr Whybrow was called as witness. He confirmed that the total air traffic from the UK to Eire was the heaviest of all the routes with the exception of Paris and Amsterdam; this was a high density route and the rate of growth of traffic should accelerate although fares were high by comparison with boat and rail fares. BEA load factors were high and the capacity they offered was small. He confirmed that the BEA document showed their 1960 load factor to be between 77 and 90 per cent—too high to be good for the public.

Mr Marking of BEA asked what reasons Mr Whybrow would suggest for BUA being granted a licence. Mr Whybrow said that BUA would give the travelling public the choice of another operator, another London airport, and different aircraft.

Mr Collingwood of BEA explained the special features of the Anglo-Irish bilateral agreement. BEA were not taking up 50 per cent of the total capacity because the 1945 agreement had given the Irish a monopoly of the UK - Dublin route. This had been re-negotiated in 1956, allowing BEA on to the route. BEA had started with 20 per cent of the total capacity and were working up to parity with Aer Lingus, but had not yet reached it. Their load factor was high, but acceptable for a high frequency route. They were also developing a 150-seat version of the Vanguard which would offer higher capacity on this type of route. BEA believed that the traffic potential might be higher than had been estimated but this would be met by the higher capacity offered.

Mr Gardiner cross-examined on behalf of BUA and suggested that BEA seemed to be taking a more optimistic view of the future traffic than had BUA. With this Mr Collingwood agreed. [*To be continued.*]

GOODBYE BUA VISCOUNT SAFARIS—

IN October the only Viscounts in the world operating international economy-class services will be replaced by Britannias. British United Airways' African Safari and Skycoach services, operated by 62-seat Viscount 810s since October 1960, will be taken over by 87-seat Britannia 317s.

Two of the four BUA Britannias (two 317s and two 307s) based at Stansted—whence they have been performing mainly trooping work—are to be transferred to Gatwick and deployed on the Safari and (depending on the outcome of negotiations with BOAC) Skycoach routes as from October 2. This will release Viscounts for BUA's new trooping contract to Germany.

It has been apparent ever since the so-called quadripartite African pool agreement was implemented in October 1960 that BUA's Viscounts were not the most suitable aircraft for the operation of economy-class and Skycoach (British-residents-only) services. In fact, the Viscount economy-class services have not been holding their own against the obviously better and faster schedules offered by BOAC's Comets and Britannias and SAA's 707s.

Though Viscount Safari load factors have consequently been low—much lower than when BUA's predecessors, Airwork and Hunting-Clan, operated colonial coach Safaris exclusively—it seems reasonable to speculate that the pool agreement with BOAC has compensated for the uncompetitive Viscount. The replacement of this type by the Britannia will not alter the broad principles of BUA's pool agreement with BOAC. Little has been published about the terms of this pool, but—broadly—BUA have a separate pool with BOAC outside the main quadripartite agreement (BOAC, CAA,* EAA and SAA).

It is known that the BUA/BOAC pool is based on the 30:70 capacity split propounded by the Minister in 1957, and that it covers only economy-class and Skycoach (not first-class) services to East and Central Africa. However, these services form part of the UK entitlement (i.e., BOAC entitlement) in the main quadripartite pool. According to BOAC's 1960-61 report, "the corporation has limited its own effort in order to accommodate that of British United Airways." The same report does not, incidentally, remark upon limited public response to the African Skycoach services, as it does in the case of the Far Eastern and mid-Atlantic Skycoach services.

Though the Viscount has not been the right aircraft, it has done a good job for BUA—and for that company's Airwork and Hunting-Clan antecedents—in developing low-fare services to British Africa. Now it is to be replaced by the much more suitable Britannia.

—AND BUA RE-DEPLOY AT GATWICK

NEXT Monday, August 14, the first offices in British United's new £100,000 four-storey administration building at Gatwick will be occupied. This building, started only five months ago, on March 6, will be fully occupied by the end of the year. It will accommodate most of the executive, commercial and administrative staff at present in the London Piccadilly and Wigmore Street offices, the former continuing as the headquarters of the British United group.

There are no signs yet of work being started on BUA's big new maintenance building at Gatwick; it is of course only in recent weeks that accord has been finally reached with the Ministry of Aviation on the lease by BUA of that controversial bit of BEA-leased land adjoining the independent's base. Design work is in hand, the architect being Clive Pascall, who designed the new office block and also—going back to Transair days—the existing maintenance hangars.

Southend, home of Aviation Traders (Engineering), a BUA company, is likely to continue for some years as a major maintenance base for the Britannias and DC-6Cs. The broad strategy, is for Gatwick to be the airline's main operational, engineering and administrative base. There are about 1,000 people employed by BUA at Gatwick; by early next year, depending on the outcome of the present route-applications, this may well rise to 1,500.

Present BUA UK-based, fixed-wing fleet comprises four Britannias (two 307 and two 317), eleven Viscounts (three 831, three 833, three 804, two 736), two DC-6C, eight DC-4, including the first Carvair, nine Bristol 170, and five DC-3 of which three are Mk 6 "Dakmasters" (designation of the DC-3 with the Transair mods). Eight of the company's original 13 DC-3s have been sold, one to Derby Aviation, six to Jersey Airlines, and one to Martin Baker. For the future, the order for ten (plus five on option) BAC One-Elevens is firm, with no escape clause, and there is a provisional order for four VC10s.

*In 1957, BOAC bought full rights to CAA's traffic to the UK for £1¼m payable in ten-year instalments up to 1967.

FALCON'S FLEET

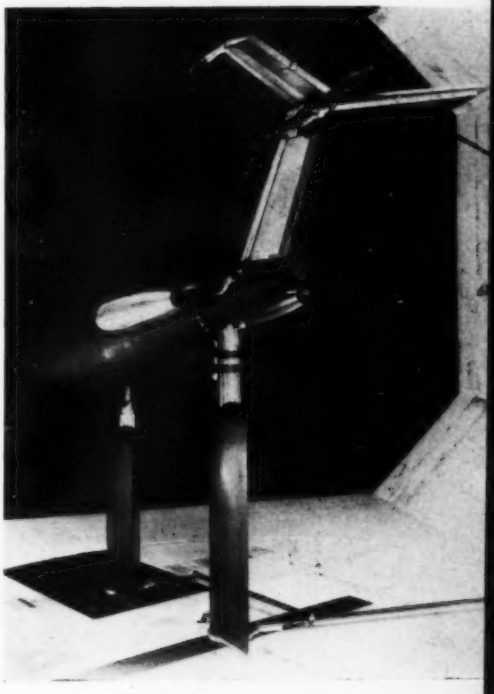
OF the four Constellation O49s bought in America by Falcon Airways, one, G-AHEL, was recently seen operating at Gatwick without markings. Purchaser of this aircraft is Trans-European Airways, who are now the registered owners, although Falcon Airways is still the operator. Mr Frederick Beezley, joint managing director of Falcon Airways, tells *Flight* that the aircraft is now in Trans-European markings, the purchasing agreement having now been finally concluded.

The second Constellation, G-AMUP, of which Falcon is also the registered owner, is at Fields being modified to ARB C of A standards, which calls for work on the fire protection system. This modification programme was one of the factors contributing to the recent difficulties experienced by Falcon Airways in having aircraft available for inclusive tour operations from Gatwick. The work had taken rather longer than had been anticipated, according to Mr Beezley—about seven weeks in the case of G-AHEL.

A third Constellation, G-AHEJ, of which Falcon is the registered owner, is in storage at Biggin Hill pending similar modification work. The fourth aircraft, OE-IFA, says Mr Beezley, was bought by Falcon in America on behalf of the Austrian airline Aero Transport Flugbetriebsgesellschaft, part of the arrangement being that Falcon would provide operating crews. At the moment Falcon remains the registered owner "as the best way of protecting our residual interest in the aircraft, which is not yet paid for." Falcon, finding themselves with no aircraft available to carry out inclusive tour flights for Sky Tours, asked the Austrian company for the use of their Constellation—and these were the operations that were banned by the Ministry (*Flight*, July 27, page 132). Up to the time of going to press, Falcon Airways had still not been able to establish from the Ministry the precise reason for the unprecedented step taken by the Ministry, who issued a statement, recorded in our July 27 issue, which referred to "the safety requirements of the Air Navigation Order, 1960, and particularly the safety conditions attached to the air operator's certificate held by Falcon Airways."

Mr Beezley recalls that when he protested to a Ministry official he was told that the action had been taken on the orders of Mr W. E. B. Griffiths (Director of Aviation Safety at the Ministry). He had telephoned Mr Griffiths, who had slammed down the receiver.

Another independent, Air Safaris, has since applied to the ATLB for licences to carry out the Sky Tours work for which Falcon had licences. Asked how commercially serious to Falcon this transfer will be, Mr Beezley says: "It is too early to say yet; it is the loss of reputation rather than the loss of money that is of concern." The loss of the work, he says, is not likely to prove fatal; the real difficulty "is the continued hostility of the Ministry coupled with the loss of prestige." Does Mr Beezley believe in the old adage that any publicity is good publicity? "I would rather not have had it," he says, "but if we can survive and keep our heads up it may not prove to have been too bad a thing. I do not mind a fair fight; I thrive on them. But the operative word is fair."



First of many BAC One-Eleven tunnel models to be tested in 1961 and 1962, this rear end has been on test at the RAE, Farnborough. A detailed description of the BAC One-Eleven appears on pp. 182-86 of this issue

AIR COMMERCE...

AN AIRPORT AUTHORITY

HARD on the heels of the recent Select Committee report on London's airports comes a Government White Paper* outlining proposals for an independent Airport Authority—probably the most important of the Select Committee recommendations. This Authority will be set up, perhaps in 1963 or 1964, to own and manage the four main international airports owned by the State—Heathrow, Gatwick, Stansted and Prestwick—and will plan, build and manage any new ones eventually required. The airports in this group have a closely co-ordinated function as the principal gateways into the country for normal scheduled services, says the White Paper, and they also form a convenient unit for management which is at the same time large enough to offer a reasonable career structure and variety of work and to be attractive to able men. Furthermore, these four airports are collectively within sight of paying their way.

The Authority might also be made responsible for providing and managing an international heliport in central London—though the Minister said at a news conference last week that the site will be chosen before the Authority is formed. Details of the Authority's structure and functions have not yet been fully worked out; when they have been, and when Parliamentary time is available, the necessary legislation will be introduced.

The 22 State-owned airports are divided into four groups, of which Group I comprises the "big four" to be run by the new Authority. Group II comprises aerodromes, other than the principal international gateways, which serve some of the main centres of population: Aberdeen, Belfast, Blackpool, Bournemouth, Cardiff, Edinburgh and Glasgow. These are to be turned over to local management, and although local authorities can apply to the Government for financial aid to run these airports such aid will not be granted unless there is a good case for it. The Government is prepared to subsidize the aerodromes in Group III, in the remote parts of Scotland, which are never likely to pay their way. They do, however, form a homogeneous unit for management and could be run by an agent on the Government's behalf. The aerodromes at Land's End and the Scilly Isles form Group IV and, like those in Group III, will be subsidized and run by an agent.

Since the new policy will result in the *en route* technical services (and aerodrome technical services in some cases) being transferred to other hands, the Government agrees with the Select Committee's recommendation that technical services should not be provided free by the State. The Government considers it would be right to levy charges for the use of these services, both *en route* and at aerodromes, and powers to levy such charges will be sought from Parliament. The Government will retain control of the *en route* services, and also of technical services at aerodromes where these interact closely with the *en route* services, or where other special circumstances require it.

[*Leading article—page* 173.]

* Comd. 1547. Civil Aerodromes and Air Navigation Services.

"WALK-ON" GATWICK - PRESTWICK

ON July 31 an Overseas Aviation DC-4M landed at London Gatwick to be greeted by a skirl of bagpipes. The company had just inaugurated its new scheduled service linking Prestwick with Gatwick *via* Manchester. The service operates on Mondays, Wednesdays and Fridays and the fare is £7 single all the way, or £5 4s single between Manchester and Prestwick. There are no traffic rights between Gatwick and Manchester.

The chairman of Overseas, Mr Ronald Myhill, said at Gatwick at a brief ceremony inaugurating what appears to be Britain's first "walk-on" service: "I feel quite strongly that the air travelling public has had, and is still having, a raw deal. They are paying too much and are still being treated as if it were a special privilege to obtain a seat on an aeroplane. To require passengers to humbly present themselves 45 or at least 30min before flight departure was, and still is, a firm rule and there must be many among you who have arrived a few minutes after zero hour to find yourselves confronted by an official but, alas, no seat."

He described the new service as one which is "as near as possible a flying Pullman." Prior booking is not essential—passengers may take their seat at any time after arrival at the airport and those with anything heavier than light hand baggage are required to report only 20min before departure. Says Mr Myhill: "The harassed businessman who finds himself late and who arrives only five minutes before departure time will be welcomed and shown to his seat—he can obtain his ticket just before boarding." He points out that the Overseas coach services from airport to city centre are free, and will stop *en route* for the convenience of passengers.

Mr Myhill welcomes the change in Government policy, "which has enabled private enterprise to compete." The fare at the moment is the same as that applied by BEA, but Overseas have applied for a reduction of 10s Prestwick - Gatwick and 9s Prestwick - Manchester.

He also points out that the Overseas fleet is capable of moving 2,500 troops at any one time, and was able to assist with the military uplift during the recent Kuwait crisis. He thinks it is "not out of place" to suggest that the Government "should consider what assistance could be provided to ensure that companies like Overseas are always able to respond promptly to such demands."

Overseas now describes itself as one of Britain's largest independents. Certainly, in terms of fleet size, it is second only to British United Airways. The scene at Overseas' base at Gatwick is quite remarkable: during *Flight's* visit last week we counted more than a dozen DC-4M Argonauts and North Stars dispersed around the hangar, together with Vikings and other aircraft. Eight of the 15 North Stars recently bought from TCA have now arrived, and the remaining seven are being ferried over at intervals. Some are already in revenue operation, their Canadian certificates being validated by the ARB up to October 31. Meanwhile work goes on bringing the aircraft up to ARB standards, and to the seating capacity of Overseas' existing five ex-BOAC Argonauts (another four are owned by Overseas' Danish associate, Flying Enterprise). The TCA aircraft arrived as 60-seaters and are being fitted with ten more to bring them up to the Argonaut 70-seat standard.

Overseas cannot disclose the price paid for the 15 TCA North Stars, but say it was a cash deal covering also spares and a simulator. Some are now being advertised for re-sale; possibly seven or eight will be sold, for about £30,000 each "as is," or—completely checked and refurbished—for £67,000-£70,000 each.

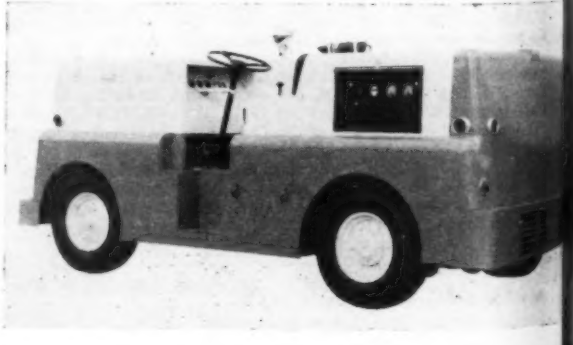
The task of absorbing the new aircraft into the existing Overseas operational and engineering organization is obviously one of some magnitude, and the scene at Gatwick is one of considerable activity. One of the engineering problems is that although the North Stars were maintained to a very high standard, the maintenance schedule is different from that of the Argonaut to which Overseas are accustomed, and Canadian-approved engine and component lives are different. For example, ARB overhaul life of the Argonaut engine is 1,400hr compared with 1,600hr on the North Star; Argonaut propeller life is 1,250hr, compared with 2,600hr on the North Star.

Overseas have nine Vikings, one operating in the markings of the Swiss company Universal, and in the hangar can be seen an ex-Nigeria Airways Dove being refurbished and converted for aerial survey work. It is believed that Hunting Aero Surveys Ltd are the likely purchaser. Of the four Ambassadors bought by Overseas from BEA, two are on a check 5 at Fields, while the other two have been sold to Globe Air.

BOAC 1960-61: A POSTSCRIPT

FOLLOWING our review last week of the BOAC annual report and accounts for 1960-61, it is appropriate to put on record certain other passages in this document—the fullest ever published by BOAC—and some of the points made by Sir Matthew Slattery, chairman.

In a section devoted to the Air Transport Licensing Board, the report says that the Board's decision to license Cunard Eagle for the North Atlantic route "came as a surprise and a disappointment to the corporation." There is a veiled hint—no more—that the corporation might have to cancel some of its VC10s (page 37), and there is the suggestion (emphasized by Sir Matthew at a news conference) that the Board, by deciding that "material diversion" of BOAC's traffic should not preclude the licensing of Cunard Eagle, was contrary to the principles of the Act. (As this issue closed for



This Model 3181 a.c./d.c. truck is a new self-propelled ground power unit made by the Motor Generator Corp of Troy, Ohio. It is capable of providing d.c. ground power for aircraft of DC-7 or Britannia size, and 400-cycle a.c. power for 707s or DC-8s

press, BOAC published the grounds of their appeal against this decision.)

About the North Atlantic, the report draws attention to the fact that BOAC's competitive position suffers from the corporation's inability, for a variety of reasons, to offer through services from North America into the main gateways of the Continent such as Paris, Rome and Frankfurt. But there is the encouraging statement that "the southern routes had a very successful year," and a reminder of two other simple facts: (1) BOAC is the third largest international air freight carrier in the world, and (2) the second largest carrier of international air mail.

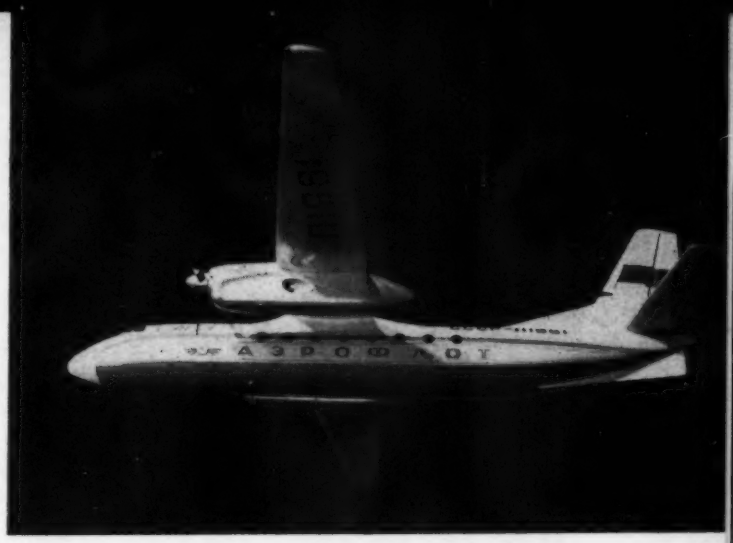
It is also estimated that the corporation's engineering costs, 10½d/c.t.m. in 1957-58, and now just over 6d, will be down to 5½d in 1961-62—which BOAC believes "compares favourably with the best of our competitors." These words were written before the wildcat engineering strike.

There is an informative table devoted to engine overhaul lives, in which it is predicted that the 707 Conway engine will be up to 2,400hr in 1962 and that the Comet's Avon will be up to 3,500hr in the same year—which will surely be a record for any turbojet. There is a section devoted to the corporation's "partnership" (i.e., pooling) arrangements, but there is no new information, merely the statement that BOAC is the "pivotal figure" in the pooling arrangements with Commonwealth airlines.

Finally, there is the remarkable fact that BOAC's charter operations in 1960-61 earned £4.7m compared with £1.8m in the previous year—three-quarters of the business being done in the Atlantic and Caribbean. This new business was, BOAC says, won "almost entirely from foreign operators."

At his news conference Sir Matthew Slattery had something to say, in answer to questions, about the supersonic airliner. "I don't want a supersonic transport at all," said Sir Matthew. "It is not going to bring lower fares or generate new traffic. I think it is going to be an infernal nuisance. I would like to see the airlines agree not to have one. I think the Americans feel the same, but they are worried about what the Russians are doing." However, if BOAC was to remain competitive it would have to have a supersonic airliner. He thought the go-ahead about the British project would have to be given "in the next two or three months." He thought that 1969-70 could see a British Mach 2 aircraft in service "if we went ahead now." He did not think that Mach 3, which the Americans were doing, would be available before 1973-74.

Of the independents Sir Matthew said: "Lest you should think that the independents are poor little people who must not be bullied by the great big corporations, it is as well to remember that they perform 24 per cent of the total UK transport effort." Of the enormous increase in BOAC's charter work, he thought it "seemed to be the best thing to do with our surplus DC-7Cs," for which there was no ready re-sale market. Of the ATLB, he thought that the Board "had misdirected itself and is not paying attention to the matters to which it was required to pay attention by the Act." Of fares, he said: "We would need only a slight increase in fares to make us into a highly profitable organization." Of the specialist freighter, he thought it was "still some five years off"; the DC-7Fs "are jolly nearly making money" but the 707s have a freight capacity of seven tons—"which is a lot to be filled up."



These "air-to-airs" of the An-24 (above) and An-10A (below) provide refreshing new angles on these types, hitherto familiar mainly from pictures taken on the ground. The Russians are not noted for their air-to-air photography, so "Flight's" photographer took these pictures of the beautiful models displayed at the recent Soviet exhibition in London

BREVITIES

Financial assistance given by the Government to the development of Manchester airport in the past ten years amounts to £1.5m.

We regret to record the death of Mr G. C. James, airport manager for BOAC at Malton, Toronto, in a car accident.

For the record, July 25 was the day on which the CL-44 entered regular airline service. Seaboard World Airlines opened a scheduled transatlantic cargo service with CL-44D4s from Frankfurt to New York.

The Clark Equipment Co of Buchanan, Michigan, will manufacture and market under licence from Douglas a new system, known as "Glide-Aire," of handling materials by floating them on air, using a principle similar to that of "ground effect" vehicles.

A two-volume report exceeding 400 pages, entitled "Airport Transportation—A Study of Transportation Means Between Airports and the Metropolitan Areas They Serve," has been prepared by Human Sciences Research, Inc, under contract to the FAA Aviation Research and Development Service.

The Convair 990 will be certificated for a landing weight of 202,000lb, an increase of 22,000lb. Maximum take-off weight of the domestic 990 is increased by 5,000lb to 244,200lb, bringing the take-off weight up to that of the intercontinental 990. Maximum landing weight of the Convair 880 has been increased to 137,000lb, and maximum take-off weight of the 880 Model 22M has been increased to 192,700lb.

Northwest are reported to be considering the purchase of a seventh Boeing 720B and the lease of two others from Boeing.

Mr Thorneycroft has expressed his support for the proposed use of the western part of Blackbushe as a private aerodrome for club and private owner use.

All military and non-scheduled flights to and through the Sudan have had to be cancelled until further notice unless aircraft have sufficient fuel to transit the Sudan without taking on fuel except at Port Sudan.

Proposals have been received from Rolls-Royce and Bristol Siddeley for a supersonic airliner engine, and are under consideration by the Ministry of Aviation, revealed Mr Thorneycroft in answer to a Parliamentary question recently.

An Italian Parliamentary Committee has been set up to enquire into affairs at Fiumicino airport and its report was to have been presented by now. The date is to be extended to December 31 due to the unexpected volume of documents and to allow a more detailed examination of them.

The issue is announced of the following sections of British Standard B.S.3224 for lighting fittings for civil land aerodromes: Section D2, Omni-directional elevated runway-lighting fittings; Section D6, High-intensity elevated runway-threshold lighting fittings and Section D7, Omni-directional elevated runway-threshold lighting fittings.

SERVICE AVIATION

Air Force, Naval and Army Flying News

One of these Wessex 1s, No 507, is seen returning to its makers' airfield at Yeovil for examination after over 860 hours' evaluation flying for Naval service, conducted by 700H Sqn at RNAS Culdrose. The other, No 506, came along to ferry the crew back to base

Regiment Commandant-General

WITH effect from August 5, AVM E. M. F. Grundy, CB, OBE, is Commandant-General of the Royal Air Force Regiment. He succeeds AVM J. H. Harris, CB, CBE, who is retiring from the RAF. The new commandant-general has been AOA, Far East Air Force, since November 1958; previously he was chairman of the NATO military agency for standardization in London and prior to that served in Washington as SASO with the British Joint Services Mission.

Services at Farnborough

ALL three Services are participating in this year's SBAC Flying Display at RAE Farnborough (September 4-10) and there will be some unusual features. The Royal Navy, absent from last year's Show, are putting up a formation aerobatic team (Scimitars of 800 Sqn) and will be showing air refuelling of Sea Vixens and Scimitars by buddy pack; the Special Air Service Regiment of the Army are doing parachute dropping with the RAF; and part of the RAF representation—which will include the Blue Diamonds formation aerobatic team of 92 Sqn—will be a tactical exercise during which Beverleys will land troops in a simulated attack on the control tower. (*Other Farnborough Show news: page 174.*)

General Paul Stehlin, Chief of Staff, French Air Force, presenting the Kinkaid Trophy to SUO M. R. Hayward when he reviewed the passing out parade of No 79 Entry at Cranwell last week. SUO Hayward created a record by winning seven out of the nine prizes—including the Sword of Honour and Queen's Medal—for which he was eligible

Controlling Information

WITH the appointment of AVM G. A. Walker as AOC-in-C Flying Training Command from September (this page, June 29), his post as Chief Information Officer at Air Ministry is being taken over by Air Cdre J. Barraclough, CBE, DFC, AFC. The new CIO, who is 43, is at present Senior Operations and Training Officer at FEAF headquarters in Singapore. He joined the RAF in 1938 and spent the early part of the war flying Sunderlands, first with 240 Sqn and afterwards with 209 Sqn in the Mediterranean area. He was awarded the DFC in 1943. After the war he carried out flying instruction and air staff duties at home and abroad, later commanding successively Biggin Hill and Middleton St George.

Singapore to Andover

AN air commodore who as an engineering officer in 1940-41 helped with the writing of pilots' notes while with the CFS handling squadron under the Schneider Trophy pilot Wg Cdr George Stainforth is joining Maintenance Command headquarters on September 23. Air Cdre T. E. J. Fitton, who has been STSO with the Far East Air Force since March 1959, becomes Air Commodore (Technical) on that date. Under a recent Maintenance Command re-organization, certain posts and duties were re-allocated, and Air Cdre Fitton's appointment will embody duties previously carried out by a senior technical staff officer.

Last Operational Meteor

FOR some time there has been a competition between Nos 60 and 81 Sqns at Tengah on Singapore Island to see which squadron would have the last Gloster Meteor in RAF operational service. Recently No 81 lost the contest when Flt Lts Brian Ashley and Richard Littlejohn were edged reluctantly into the cockpits of their Meteor 10s and told to fly the aircraft to Seletar for disposal. The squadron is to continue in its present role with Canberra PR.7s and the "positively last Meteor" to fly operationally with the RAF will be one of the FAW.14s of No 60 Sqn, whose re-equipment with Javelin FAW.9s is not yet complete. The first Service jet aircraft, Meteors were first introduced 16 years ago. No 60 Sqn is being joined at Tengah shortly by No 20 Sqn, re-formed with Hunter FGA.9s.

IN BRIEF

The Air Minister, Mr Julian Amery, last week went to Malta and Idris (Libya) during his visits to the Royal Air Force overseas.

Air Cdre J. E. Allen-Jones, OBE, is to be promoted from deputy director to director of legal services at Air Ministry on October 7.

The aircraft carrier *Centaur* made a diversion of more than 5,000 miles, cancelling a visit to the US and Canada, to replace HMS *Victorious* off Kuwait.

The Australian Minister for Air, Senator H. Wade, said recently that an RAAF team would fly to the United States in September for specialized training in handling Lockheed Neptunes anti-submarine aircraft. No 10 (MR) Sqn is being re-equipped with Neptunes.

RAAF crew members of the Convair Metropolitan which will be used by the new Governor General of Australia, Lord de L'Isle and Dudley, VC, are Flt Lt J. T. Carter, captain; Fg Off I. D. Bridge, co-pilot; Flt Lt N. Reidy, navigator; Cpl R. W. Downie, fitter, and LAC W. J. Bankes, steward.

Three "Tiger" squadrons—01/12 escadrille le chasse of the French Air Force, equipped with Mystères and based at Canbari; No 79 Sqn, USAF, with F-100s at Woodbridge; and No 74, RAF, with Lightnings at Coltishall had an informal get-together at Woodbridge recently.

Photographs show stages in overhaul of T.33 jet aircraft at Tarrant Rushton.

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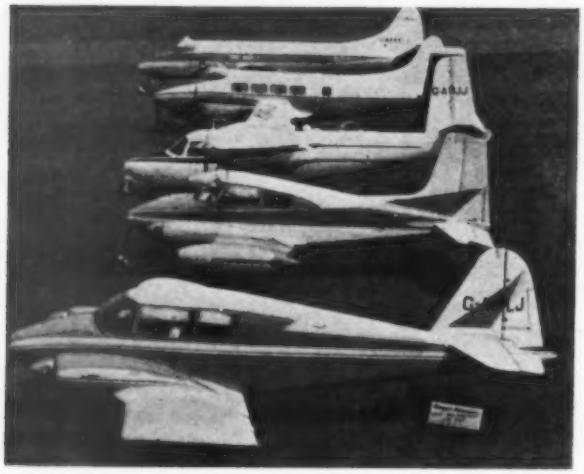

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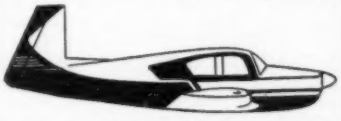

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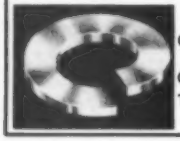

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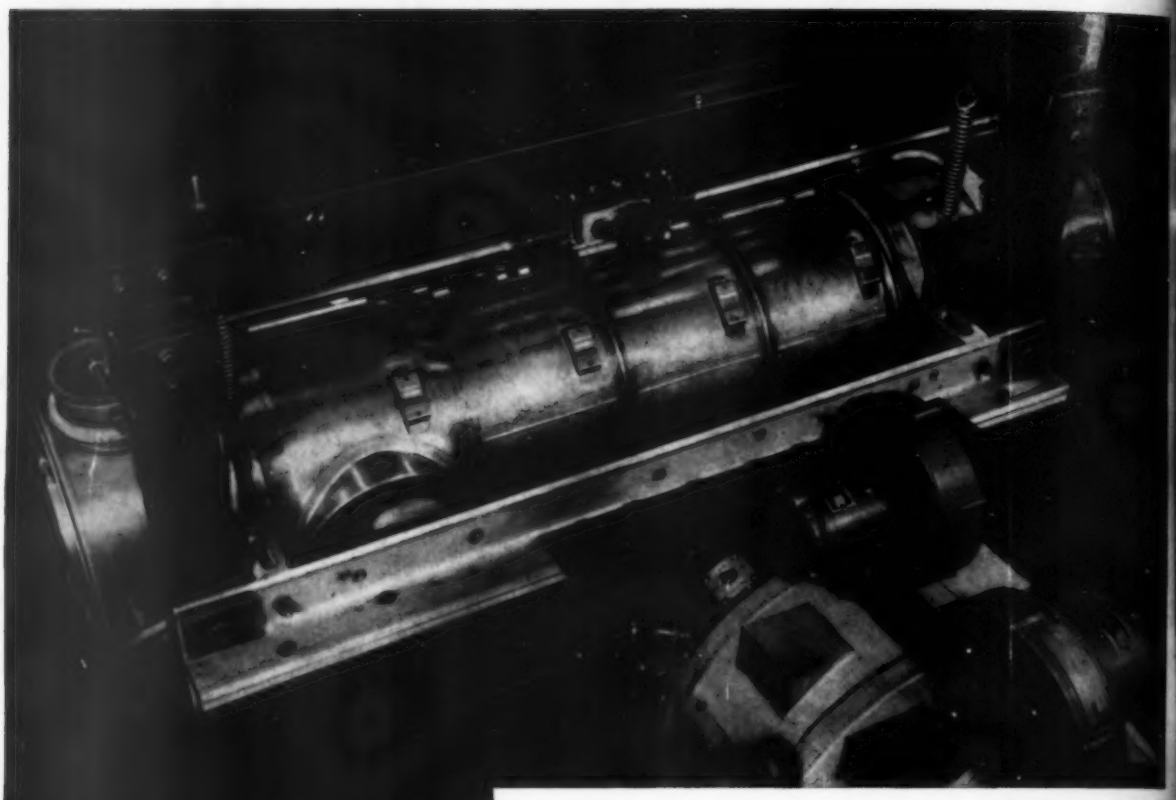

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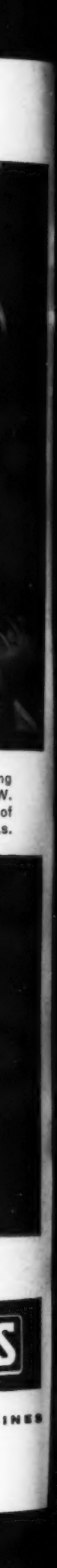
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